BP A4

SEIRIES AC SERVO MOTOR SYSTEM

INSTRUCTION MANUAL

Abstract

BL series AC servo motor is the latest high performance servo motor. Which adopts the rare-earth permanent magnet, high resolution optical encoder and the most up-to-date designation, has the advantage of compact size, high response, low-noise, low vibration, high resolution and high speed.

- Full series including: low inertia, middle inertia, high inertia，Output range : 30W~40KW
- Frame number：40, 60, 80, 92, 123, 192, 280
- With 2500ppr encoder, the resolution is 10000 pulse / round
- Max speed: 4500r/min
- Standard Installation Dimension:(The installation dimension of 200W、400W、750W Servo Motor are the same with that of National Motor.)
- We can also make motors as customer's requirements.
- Supplied standard cables

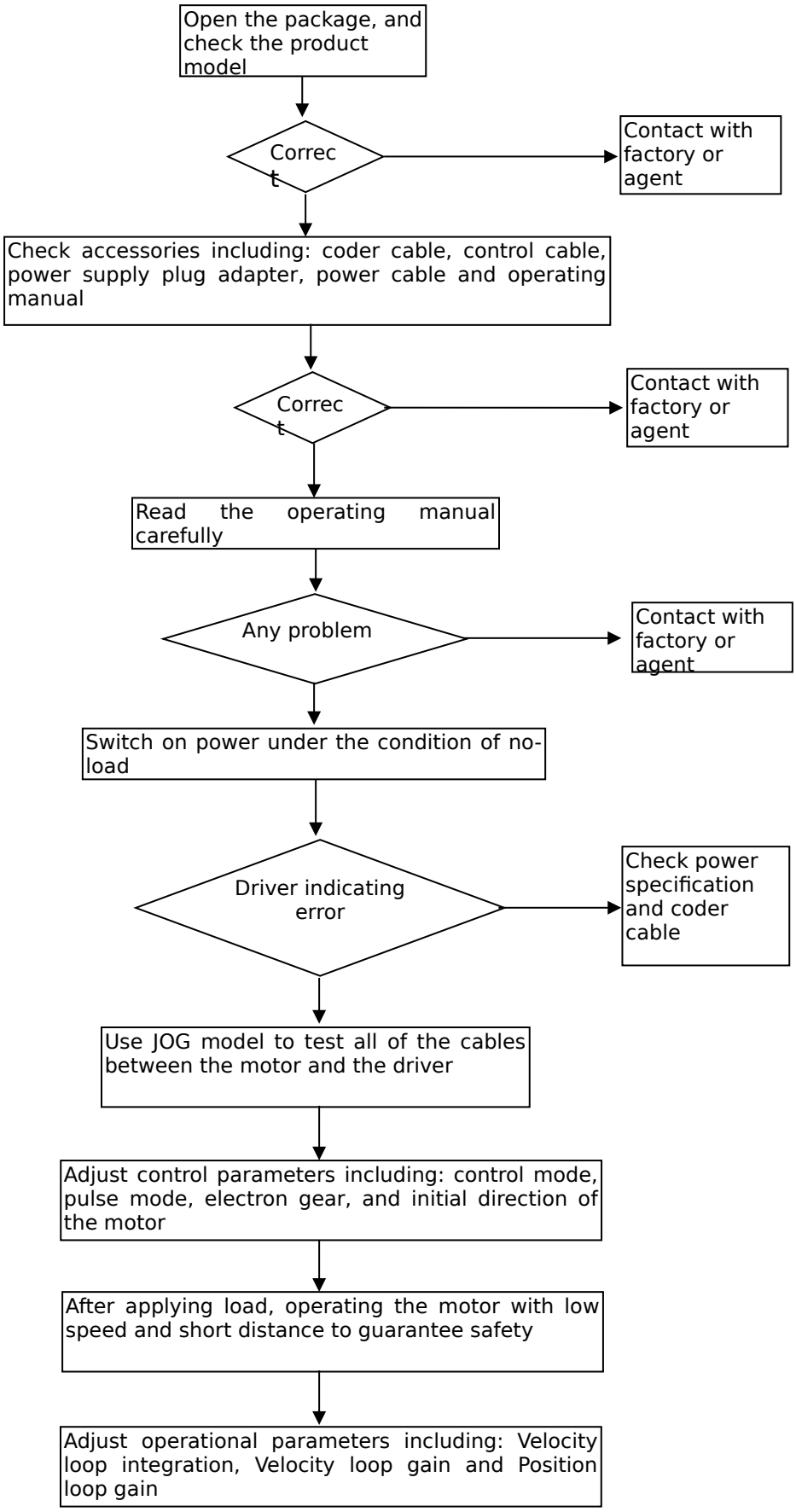
PSDA series AC servo driver is the latest full digital servo driver. Which adopts the DSP technology, CPLD technology, high quality IGBT module, and the full software, realizes the close-loop servo control of current, speed and position.

- With 5 control mode options：Position mode, Velocity mode, Analogue velocity mode, Torque mode, Inner PLC control mode (APCM)
- With the protection of over current, over voltage, under voltage, over load, over heat, encoder fault
- With the simple operation, it is very easy to use.
- With the standard ModBus RTU protocol, it is very easy to communicate with all kinds of HMI.
- With 3 times overload capacity, it is suited to the large dynamic application.
- With the RS-232 and RS-485 communication interface
- With 12 options of monitoring item

CONTENT

1		Servo motor operation flow	4
2		Safety precautions	5-6
3		Check the model of the servo motor and the driver	7
4		**Installation and wiring**	8
	4.1	Installation notes	8-9
	4.2	Series BPA4 electric wiring diagram	10
	4.3	Network connecting	10
	4.4	Technical parameters	11-20
	4.5	Motor power cord definition	20
	4.6	Motor encoder wire definition	21-22
	4.7	Plug(CN2) pin definition	23
	4.8	Control mode and wiring	24-28
	4.9	Pulse input mode	29
	4.10	Pulse input method and wiring diagram	30
	4.11	Digital input and output wiring	31-32
	4.12	Wiring of hold brake	32
5		**Operation of driver**	
	5.1	Operation panel of driver	33
	5.2	Operation mode of the panel	33
	5.3	Parameter setting & saving procedure	34
	5.4	Monitor selecting procedure	35
	5.5	Servo motor's auxiliary mode and JOG mode procedure	36
6		**Position mode**	
	6.1	Position mode parameter setting	37
	6.2	Parameter setting procedure of position mode	38-39
7		Parameter setting of hold brake	39
8		Alarm description, possible cause and corrective action	40-41
9		**Annexed table**	
	9.1	Monitor mode	42
	9.2	Auxiliary function	43
	9.3	Parameter table	44-46
10		Servo motor parameter adjustment and system analyze application software	46
		Dimension of servo motor	47-49
		Dimension of driver	50-54

1、 Servo motor operation flow


Open the package, and check the product model
Correct
Contact with factory or agent
Check accessories including: coder cable, control cable, power supply plug adapter, power cable and operating manual
Correct
Contact with factory or agent
Read the operating manual carefully
Any problem
Contact with factory or agent
Switch on power under the condition of no-load
Driver indicating error
Check power specification and coder cable
Use JOG model to test all of the cables between the motor and the driver
Adjust control parameters including: control mode, pulse mode, electron gear, and initial direction of the motor
After applying load, operating the motor with low speed and short distance to guarantee safety
Adjust operational parameters including: Velocity loop integration, Velocity loop gain and Position loop gain

2、Safety Precautions (Important)

Observe the following precautions in order to avoid injuries of operators and other persons, and mechanical damages.

	DANGER	**Indicates a potentially hazardous situation, which, if not avoided, will result in death or serious injury.**
	CAUTION	**Indicates a potentially hazardous situation, which, if not avoided, will result in minor or moderate injury and physical damage.**
	ATTENTION	**This symbol indicates that the operation is prohibited.**
	ATTENTION	**This symbol indicates that the operation must be performed without fail.**

DANGER

	An over-current protection, earth leak breaker, over temperature protection and emergency stop should be installed.	Failure to observe this instruction could result in electric shocks, injuries and/or fire.
	Perform the transportation, wiring and inspection at least 10 minutes after the power off.	Failure to observe this instruction could result in electric shocks.
	Ground the earth terminal of the driver.	Failure to observe this instruction could result in electric shocks.
	Install an external emergency stop device so that you can shut off the power in any emergence cases.	Failure to observe this instruction could result in electric shocks, injuries, fire, malfunction and/or mechanical damages.
	Don’t insert your hands in the driver.	Failure to observe this instruction could result in burns and/or electric shocks.
	Don’t touch the rotating part of the motor in motion.	Failure to observe this instruction could result in injuries.

	Do not expose the cables to sharp edges, excessive pressing forces, heavy loads and pinching forces.	Failure to observe this instruction could result in electric shocks, malfunction and/or damages.

	CAUTION	
	Use the motor and driver in the specified combination.	Failure to observe this instruction could result in fire.
	If an error occurs, remove the cause of the error and secure the safety before restarting the operation.	Failure to observe this instruction could result in injuries.
	Execute the trial operation with the motor fixed but without the motor load connected. Connecting a load to the motor is possible only after successful trial operation.	Failure to observe this instruction could result in injuries.
	Don't touch the motor, driver or its regenerative resistor, since they become hot.	Failure to observe this instruction could result in burns.
	Don't touch the rotating part of the motor in motion.	Failure to observe this instruction could result in injuries.
	Don't modify, dismantle, or repair the driver.	Failure to observe this instruction could result in electric shocks and/or injuries.
	Don't hold the cables or motor shaft when transporting the motor.	Failure to observe this instruction could result in injuries.
	After recovery from the power failure, the equipment may restart suddenly. Don't approach to the equipment.	Failure to observe this instruction could result in electric shocks and/or injuries.
	Don't block the heat dissipation hole or insert foreign matters in it.	Failure to observe this instruction could result in electric shocks, injuries and/or fire.
	Make sure that the wirings are made correctly.	Failure to observe this instruction could result in electric shocks, injuries and/or fire.

Matters need attention before operation		
!	After opening the package, make sure the product is what you ordered.	If the product is not correct, contact dealer of sales agent.
!	Check whether the product has been damaged or not during transportation.	If the product is damaged, contact dealer of sales agent.

3. Check the model of the Servo Motor and the Driver

Servo Motor Model Designation

60	BL	□3□	-	B	40	-	30	H	□ST□
Dimension of Flange	Motor series	Sensor type		Length of Motor	Output of Motor		Speed of Servo Motor	Voltage class	With brake or not
40: 40mm 60: 60mm 80: 80mm 92: 92mm 123: 123mm 192: 192mm 280: 280mm	BL series	1□Switch Halls 2 : Rotary transformer 3 : Optical encoder 4 : Other encoder		A□B□C□D□E	03: 30W 40□400W 100: 1KW 1500: 15KW		10 □ 1000 r/min 20 □ 2000 r/min 30 □ 3000 r/min	H□200V M□100V L□Low voltage	ST: standard ST-B: With DC24V brake

Servo Motor Driver Model Designation

PSDA	10	3	3	A8	GN	-	N1
Driver series	Max. Output	Power Supply	Sensor type	Version number	Hardware Version		Function Type
PSDA PSDS	3A:: 30w 04: 400W 10: 1KW 40: 4KW 150: 15K W	1: Low Voltage DC 2: 1Ph/ 220VAC 3: 3 Ph/ 220VAC 4: 300VDC 5: 3 Ph 380VAC	1: Switch Halls 2: Rotary transformer 3 : Optical encoder 4 : Other encoder	A6 A8	GN		N1:Stanard T: Special C:Cutter P:Printer F:Divided

Remarks

Standard Driver model □

PSDA0213A5□PSDA0433A4□PSDA1033A4□PSDA1533A4□PSDA2033A4□PSDA4033A4

4. Installation and Wiring

4.1.1 Installation notes of motor

◆ **Location**:

Indoors, where the driver is not subjected to rain water and direct sun beams.

Avoid the place where the driver is subjected to corrosive gases, flammable gases,

Grinding liquids, oil mists, iron powders and cutting particles.

Place in well ventilated, and humid- and dust- free space.

Easy maintenance, inspections and cleaning are also important.

◆ **How to install**□

The motor can be installed either vertically or horizontally. Observe the following notes.

A. Horizontal mounting---- Place the motor with the cables outlet facing down to prevent the entry of oil and water.

B. Vertical mounting---- If the motor is coupled with mechanical devices, make sure the oil and water of the mechanical device does not enter into the motor.

- Don’t hit the end bracket of the motor; otherwise the encoder will be damaged.
- Flexible coupling is recommended in order to keep the radial load smaller than the permissible value.
- Don’t hit the shaft with a hammer directly while attaching/detaching the coupling to the motor shaft. (Otherwise the encoder or the end bracket will be damaged.)
- Make sure that both of radial and thrust load be applied to the motor shaft during installing and running becomes within the specified value of each model.

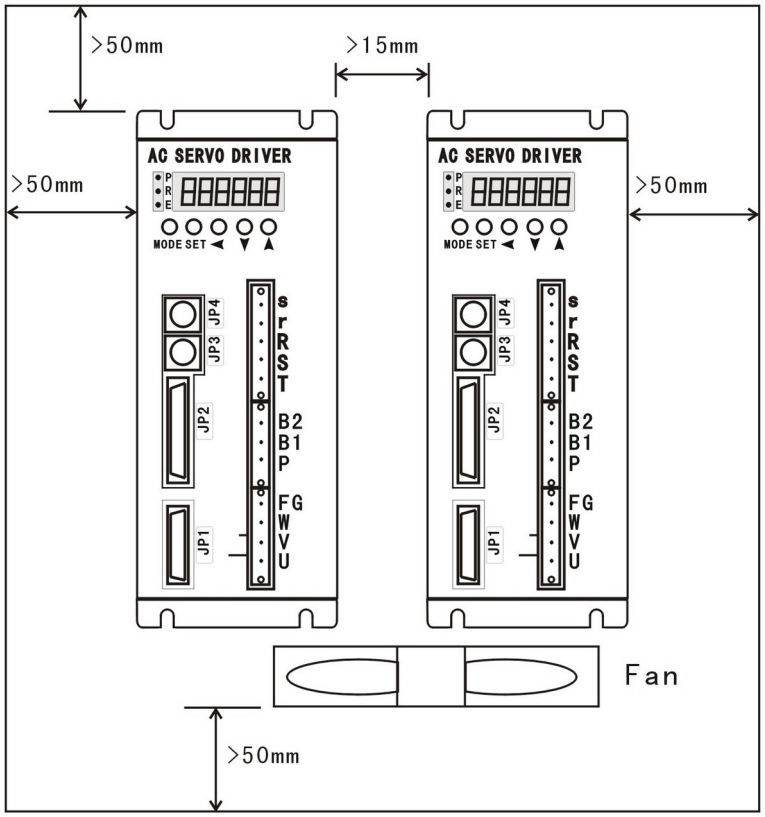
4.1.2 Installation notes of driver

- **Location**:

  Indoors, where the driver is not subjected to rain water and direct sun beams.
  Avoid the place where the driver is subjected to corrosive gases, flammable gases,
  Grinding liquids, oil mists, iron powders and cutting particles.
  Place in a well ventilated, and humid- and dust- free space.
  Place in a vibration-free place.

- **How to install**

  Place the driver vertically. Allow enough space surrounding for ventilation.
- Fit to noncombustible such as metal.
- If it is possible, please install fans to provide a uniform distribution of temperature in control box.
- When the power supply of the driver is shared with machines such as electric welding machine or a discharge processing machine, or even when it is not shared but a source of a high-frequency noise is in the surrounding environment, take actions such as inserting an insulating transformer and a noise filter to the power supply.
- Allow enough space to ensure enough cooling, ventilation and dry.
- Avoid the place where the driver is subjected to vibration and knockout.
- Prevent metal grinding rust and iron powders to enter into the driver possibly.
- Make sure that the driver is fixed firmly during installation.
- Be sure to use a crimp contact with insulated coating for connection to each terminal on the terminal block.
- Avoid the damage to the driver, a 10 seconds of interval between power off and power on again is preferable.
- After shutting off the driver supply, leave it at least for 10 minutes or more to touch the driver terminals. Failure to observe this instruction could result in electric shocks.
- On installation of two or more servo drivers, leave a large clearance between the top of the servo amplifier and the internal surface of the control box, and install a fan to prevent the internal temperature of the control box from exceeding the environmental conditions.



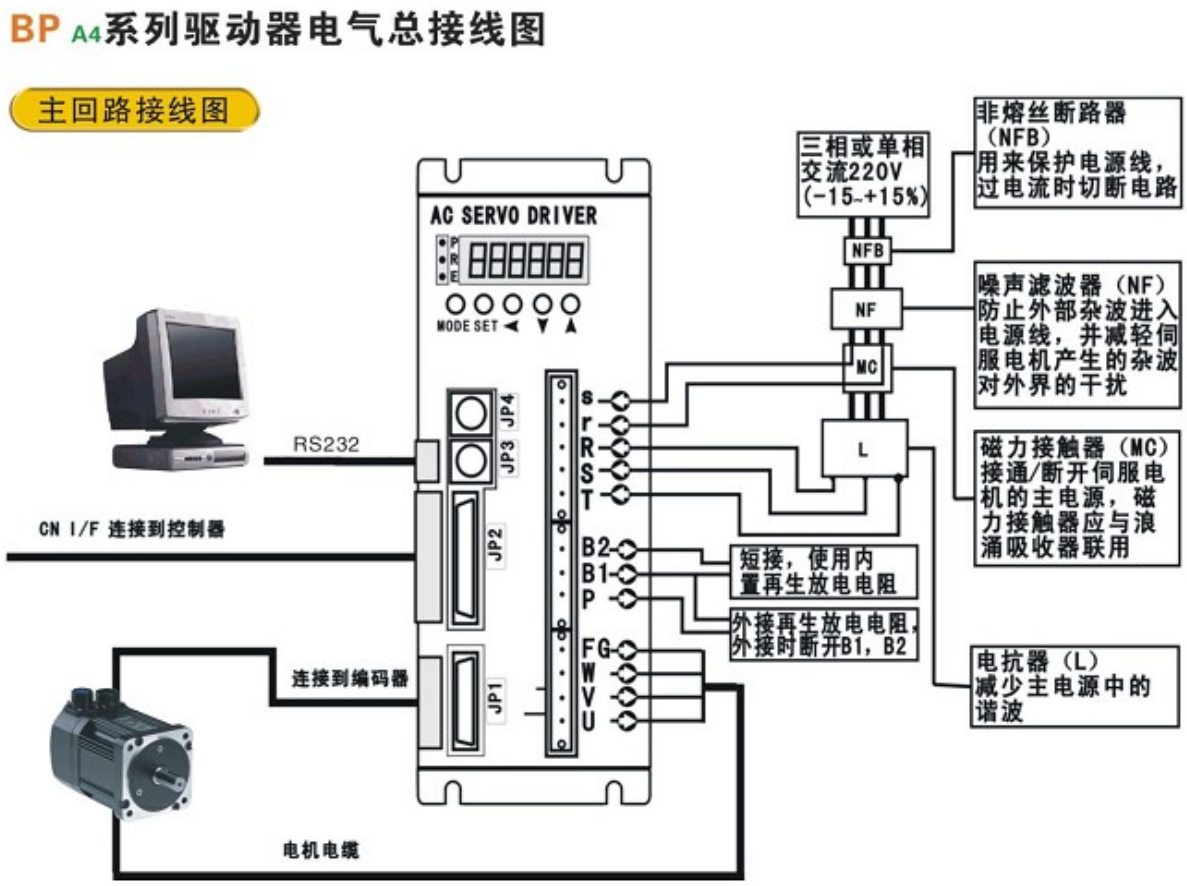
Installation diagram of multiple drivers

4.1.3 Wiring notes

Item	Purpose	Wiring type	Specification	Remarks
1	Power wires	Proper wire gauge, environmental conditions	Leave a space of 30cm or more between the power wires and do not wire them in the same duct.	Ensure that wire gauge is proper to the motor current
2	Motor wires			Ensure that motor phase sequence is matching the driver
3	Signal wires	Twisted-pair shielded wire	The max. length of the command input Wire is 3m.	
4	Encoder wires		The max. Length of the encoder input wire is 20m.	
5	Grounding	Wires as	One-point grounding must be	If the motor is

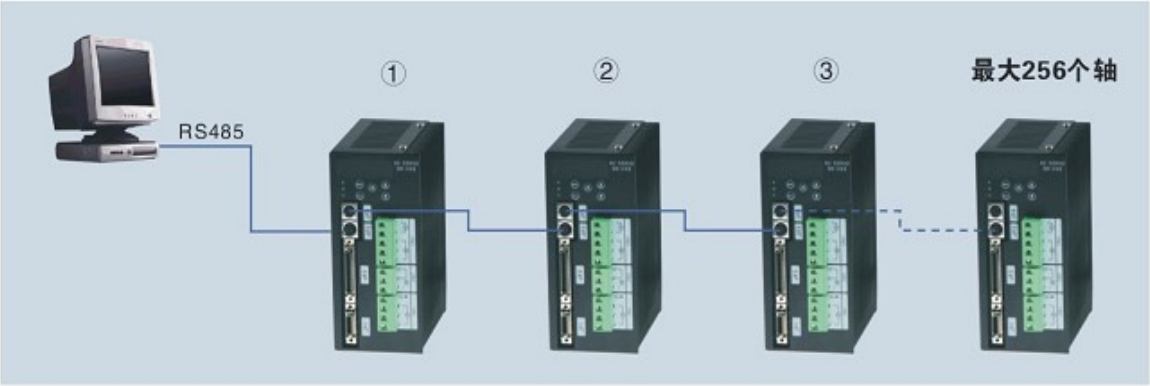
	wires	heavy as possible	applied, and the max. grounding resistance is 100Ω.	electrically insulated from the machine, ground the motor.
6	Analog signal wires	Shielded wire		
7	Regenerative brake resistor			Well connected and well ventilated
8	Brake			the surge absorbing diode is needed

4.2



4.3

网络连接



4.4 Technical parameters

4.4.1 Driver technical parameters

ITEM			SPECIFICATION
Basic specification	Power Supply	Single phase 220VAC	AC200/220 [-15%~+10%] Single phase 50/60Hz
		Three phase 220VAC	AC200/220 [-15%~+10%] Three phase 50/60Hz
	Control Mode		IGBT module with SVPWM control
	Environment	Ambient temperature	0 to +45℃
		Storage temperature	-20 to +85℃ (non-freezing)
		Ambient & Storage humidity	85%RH (non-condensing)
		Vibration/ Shock	0.5G/ 2.5G
	Structure		
	Cooling-down method		Self -cooled
Co	Max. input pulse frequency		250kpps (max. speed of servo motor)

ntrol signal	Input signal	Servo on, Built-in speed selection, Analogue command, Direction control, Brake input
	Output signal	Servo alarm, Servo ready, In-position
	Encoder feedback signal	Differential or open collector
	Monitor output	With 10 kinds of real –time data monitor, such as: Velocity monitor, Current monitor, Position offset etc
Function	Protective functions	Over-current, Over-load, Over heat, Over speed, Over voltage,
	Others	After power on, it will take 2 seconds of delay to carry out the driver inner initialization.
	Panel interface	6 bit LED display, 5 operation buttons
	Monitor interface	Optional RS232/RS485 interface
	Regeneration	Embedded braking resistor
	Dynamic brake	With dynamic braking function
	Speed frequency response	400Hz

4.4.2 Technical datas of servo motor

Low-Inertia Servo Motor

Output	P_N (W)	30	50	100
Motor Model		40BL(3)A03-30H	40BL(3)B05-30H	40BL(3)C10-30H
Driver Model		PSDA-3A13A8	PSDA-5A13A8	PSDA-0113A8
Power	V_{1N} (V)	Three Phase / Single Phase 220VAC		
Rated Speed	n_N (r/min)	3000		
Rated Torque	T_N (Nm)	0.0955	0.159	0.318
Max. Torque	T_P (Nm)	0.287	0.477	0.954
The Highest Speed	n_P (r/min)	5000		
Velocity & Position Sensor		Optical Encoder with 2500 ppr		
Electrical Potential Coefficient	k_e (Vs/rad)	0.108	0.127	0.127
Torquec	k_t (Nm/A)	0.108	0.127	0.127

Rotor Inertia	J_r (Kgm^2)	1.31×10^{-6}	2.11×10^{-6}	4.11×10^{-6}
Resistance Of Armature Winding	R (Ω)	22.7	15.0	5.87
Inductance Of Armature Winding	L (mH)	34.3	23.7	10.2
Friction & Hysteresis Torque	T_f (Nm)	0.003	0.00493	0.00986
Damping Coefficient	β (Nms/rad)	0.768×10^{-5}	1.28×10^{-5}	2.56×10^{-5}
Rated Line Current	I_N (A)	0.729	1.03	2.58
Rated Line Voltage	V_N (V)	47.9	50.5	51.7
Peak Current	I_P (A)	2.19	3.09	7.74
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	6.96	12.0	24.6
Mechanical Time-constant	T_m (msec)	2.55	1.95	1.47
Electrical Time-constant	T_e (msec)	1.51	1.58	1.74
Weight	G (Kg)	0.44	0.55	0.70
Work Duty	Cont.			
Withstand Voltage	AC1500V□1min			
Insulation Class	B			
Insulation Resistance	DC500V□10MΩMinimum			
Vibration	2.5G Minimum			
Mount Type	Flange			
Struture	Totally-enclosed self cooled			
Altitude	No greater than1000m			
Ambient temperature	0~40℃□free from condensation□			
Ambient humidity	No greater than 90%RH□free from condensation□			
Storage temperature	-20~60℃□free from condensation□			
Storage humidity	No greater than 90%RH□free from condensation□			

Low-Inertia Servo Motor

Output	P_N (W)	200	400	600
Motor Model		60BL(3)A20-30H	60BL(3)B40-30H	60BL(3)C60-30H
Driver Model		PSDA-0233A8	PSDA-0433A8	PSDA-0633A8
Power	V_{1N} (V)	Three Phase / Single Phase220VAC		
Rated Speed	n_N (r/min)	3000		
Rated Torque	T_N (Nm)	0.637	1.273	1.910
Max. Torque	T_P (Nm)	1.911	3.819	5.730
The Highest Speed	n_P (r/min)	3600		
Velocity & Position Sensor	Optical Encoder with 2500 lines			
Electrical Potential Coefficient	k_e (Vs/rad)	0.233	0.233	0.233

Torquec	k_t (Nm/A)	0.495	0.495	0.495
Rotor Inertia	J_r (Kgm^2)	0.167×10^{-4}	0.302×10^{-4}	0.438×10^{-4}
Resistance Of Armature Winding	R (Ω)	12.4	5.4	3.0
Inductance Of Armature Winding	L (mH)	31.9	17.3	10.0
Friction & Hysteresis Torque	T_f (Nm)	0.01383	0.01808	0.02144
Damping Coefficient	β (Nms/rad)	4.831×10^{-5}	7.403×10^{-5}	10.689×10^{-5}
Rated Line Current	I_N (A)	1.3	2.6	3.9
Rated Line Voltage	V_N (V)	119.8	114.7	112.2
Peak Current	I_P (A)	3.9	7.8	11.7
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	24.3	53.7	83.3
Mechanical Time-constant	T_m (msec)	1.52	1.08	0.905
Electrical Time-constant	T_e (msec)	1.95	2.23	2.42
Weight	G (Kg)	1.0	1.5	2.0
Work Duty	Cont.			
Withstand Voltage	AC1500V□1min			
Insulation Class	F			
Insulation Resistance	DC500V□10MΩMinimum			
Vibration	2.5G Minimum			
Mount Type	Flange			
Struture	Totally-enclosed self cooled			
Altitude	No greater than1000m			
Ambient temperature	0~40℃□free from condensation□			
Ambient humidity	No greater than 90%RH□free from condensation□			
Storage temperature	-20~60℃□free from condensation□			
Storage humidity	No greater than 90%RH□free from condensation□			

Low-Inertia Servo Motor

Output	P_N (W)	500	750	1000
Motor Model		80BL(3)A50-30	80BL(3)B75-30	80BL(3)C100-30
Driver Model		PSDA-0533A8	PSDA-0833A8	PSDA-1033A8
Power	V_{1N} (V)	Three Phase/ Single Phase220VAC		
Rated Speed	n_N (r/min)	3000		
Rated Torque	T_N (Nm)	1.592	2.387	3.183
Max. Torque	T_P (Nm)	4.776	7.161	9.549
The Highest Speed	n_P (r/min)	3600		
Velocity & Position Sensor	Optical Encoder with 2500 ppr			
Electrical Potential	k_e (Vs/rad)	0.254	0.254	0.254

Coefficient				
Torquec	k_t (Nm/A)	0.539	0.539	0.539
Rotor Inertia	J_r (Kgm^2)	0.71×10^{-4}	1.03×10^{-4}	1.36×10^{-4}
Resistance Of Armature Winding	R (Ω)	3.5	1.6	1.2
Inductance Of Armature Winding	L (mH)	16.2	10.3	7.3
Friction & Hysteresis Torque	T_f (Nm)	0.0465	0.0494	0.0522
Damping Coefficient	β (Nms/rad)	8.82×10^{-5}	10.16×10^{-5}	11.50×10^{-5}
Rated Line Current	I_N (A)	3.23	4.78	6.34
Rated Line Voltage	V_N (V)	104	103	102
Peak Current	I_P (A)	9.69	14.4	19.0
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	33.4	52.8	72.5
Mechanical Time-constant	T_m (msec)	1.46	1.16	1.06
Electrical Time-constant	T_e (msec)	2.06	2.30	2.34
Weight	G (Kg)	2.2	2.9	3.4
Work Duty	Cont.			
Withstand Voltage	AC1500V□1min			
Insulation Class	F			
Insulation Resistance	DC500V□10MΩMinimum			
Vibration	2.5G Minimum			
Mount Type	Flange			
Struture	Totally-enclosed self cooled			
Altitude	No greater than1000m			
Ambient temperature	0~40℃□free from condensation□			
Ambient humidity	No greater than 90%RH□free from condensation□			
Storage temperature	-20~60℃□free from condensation□			
Storage humidity	No greater than 90%RH□free from condensation□			

Low- Inertia Servo Motor

Output	P_N (W)	500	750	1000	1200
Motor Model		92BL(3)A50-30H	92BL(3)B75-30H	92BL(3)C100-30H	92BL(3)D120-30H
Driver Model		PSDA-0533A8	PSDA-0833A8	PSDA-1033A8	PSDA-1233A8
Power	V_{1N} (V)	Three Phase/ Single Phase220VAC □Three Phase 220VAC is recommended□			
Rated Speed	n_N (r/min)	3000			
Rated Torque	T_N (Nm)	1.592	2.387	3.183	3.820
Max. Torque	T_P (Nm)	4.776	7.161	9.549	11.460

The Highest Speed	n_P (r/min)	3600			
Velocity & Position Sensor	Optical Encoder with 2500 ppr				
Electrical Potential Coefficient	k_e (Vs/rad)	0.304	0.321	0.329	0.373
Torquec	k_t (Nm/A)	0.645	0.681	0.698	0.791
Rotor Inertia	J_r (Kgm^2)	1.66×10^{-4}	2.36×10^{-4}	3.07×10^{-4}	3.42×10^{-4}
Resistance Of Armature Winding	R (Ω)	4.543	3.297	1.906	1.692
Inductance Of Armature Winding	L (mH)	12.156	9.560	6.293	11.054
Friction & Hysteresis Torque	T_f (Nm)	0.04374	0.06561	0.08748	0.09842
Damping Coefficient	β (Nms/rad)	2.046×10^{-4}	3.069×10^{-4}	4.092×10^{-4}	4.604×10^{-4}
Rated Line Current	I_N (A)	2.517	3.577	4.652	4.910
Rated Line Voltage	V_N (V)	136.521	144.392	143.951	162.009
Peak Current	I_P (A)	7.551	10.731	13.956	14.730
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	15.3	24.1	33.0	42.7
Mechanical Time-constant	T_m (msec)	2.80	2.52	1.80	1.39
Electrical Time-constant	T_e (msec)	2.676	2.900	3.302	6.533
Weight	G (Kg)	2.9	3.6	4.0	4.5
Work Duty	Cont.				
Withstand Voltage	AC1500V□1min				
Insulation Class	F				
Insulation Resistance	DC500V□10MΩMinimum				
Vibration	2.5G Minimum				
Mount Type	Flange				
Struture	Totally-enclosed self cooled				
Altitude	No greater than1000m				
Ambient temperature	0~40℃□free from condensation□				
Ambient humidity	No greater than 90%RH□free from condensation□				
Storage temperature	-20~60℃□free from condensation□				
Storage humidity	No greater than 90%RH□free from condensation□				

Middle - Inertia Servo Motor

Output	P_N (W)	1100	1500	2200	3000	4000
Motor Model		123BL(3) A1100-30H	123BL(3) B1500-30H	123BL(3) C220-30H	123BL(3) D300-30H	123BL(3) E400-30H
Driver Model		PSDA1033A8	PSDA1533A8	PSDA-2033A8		PSDA-4033A8
Power	V_{1N} (V)	Three Phase/ Single Phase220VAC □Three Phase 220VAC is recommended□				

Rated Speed	n_N (r/min)	3000				
Rated Torque	T_N (Nm)	3.501	4.775	7.003	9.549	12.732
Max. Torque	T_P (Nm)	10.503	14.325	21.009	28.647	38.196
The Highest Speed	n_P (r/min)	3600				
Velocity & Position Sensor	Optical Encoder with 2500 ppr					
Electrical Potential Coefficient	k_e (Vs/rad)	0.308	0.308	0.308	0.308	0.308
Torquec	k_t (Nm/A)	0.652	0.652	0.652	0.652	0.652
Rotor Inertia	J_r (Kgm^2)	7.2×10^{-4}	9.2×10^{-4}	13.2×10^{-4}	17.2×10^{-4}	25.2×10^{-4}
Resistance Of Armature Winding	R (Ω)	1.899	1.002	0.559	0.378	0.225
Inductance Of Armature Winding	L (mH)	5.874	4.040	2.45	1.747	1.104
Friction & Hysteresis Torque	T_f (Nm)	0.120	0.167	0.199	0.221	0.255
Damping Coefficient	β (Nms/rad)	1.656×10^{-4}	2.042×10^{-4}	2.780×10^{-4}	3.530×10^{-4}	4.090×10^{-4}
Rated Line Current	I_N (A)	5.381	7.334	10.679	14.475	19.214
Rated Line Voltage	V_N (V)	137.121	134.184	132.159	131.536	129.696
Peak Current	I_P (A)	16.143	22.002	32.037	43.425	57.642
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	17.024	24.783	37.153	53.014	61.327
Mechanical Time-constant	T_m (msec)	4.822	3.251	2.601	2.293	1.997
Electrical Time-constant	T_e (msec)	3.093	4.032	4.385	4.619	4.91
Weight	G (Kg)	4.6	5.8	8.2	10.6	15.4
Work Duty	Cont.					
Withstand Voltage	AC1500V□1min					
Insulation Class	F					
Insulation Resistance	DC500V□10MΩMinimum					
Vibration	2.5G Minimum					
Mount Type	Flange					
Struture	Totally-enclosed self cooled					
Altitude	No greater than 1000m					
Ambient temperature	0~40℃□free from condensation□					
Ambient humidity	No greater than 90%RH□free from condensation□					
Storage temperature	-20~60℃□free from condensation□					
Storage humidity	No greater than 90%RH□free from condensation□					

Middle- Inertia Servo Motor

Output	P_N (W)	750	1000	1500	2000	3000
Motor Model		123BL(3) A75-20H	123BL(3) B100-20H	123BL(3) C150-20H	123BL(3) D200-20H	123BL(3) E300-20H
Driver Model		PSDA-0833	PSDA-1033	PSDA-1533	PSDA-2033	PSDA-3033

Power	V_{1N} (V)	Three Phase/ Single Phase220VAC （Three Phase 220VAC is recommended）				
Rated Speed	n_N (r/min)	2000				
Rated Torque	T_N (Nm)	3.820	5.252	7.162	9.549	14.324
Max. Torque	T_P (Nm)	11.460	15.756	21.486	28.647	42.972
The Highest Speed	n_P (r/min)	2400				
Velocity & Position Sensor	Optical Encoder with 2500 ppr					
Electrical Potential Coefficient	k_e (Vs/rad)	0.461	0.461	0.461	0.461	0.461
Torquec	k_t (Nm/A)	0.978	0.978	0.978	0.978	0.978
Rotor Inertia	J_r (Kgm^2)	7.2×10^{-4}	9.2×10^{-4}	13.2×10^{-4}	17.2×10^{-4}	25.2×10^{-4}
Resistance Of Armature Winding	R (Ω)	3.685	2.512	1.383	0.868	0.506
Inductance Of Armature Winding	L (mH)	13.216	9.091	5.513	3.930	2.483
Friction & Hysteresis Torque	T_f (Nm)	0.120	0.167	0.199	0.221	0.255
Damping Coefficient	β (Nms/rad)	1.656×10^{-4}	2.042×10^{-4}	2.780×10^{-4}	3.530×10^{-4}	4.090×10^{-4}
Rated Line Current	I_N (A)	3.66	4.88	7.32	9.76	14.65
Rated Line Voltage	V_N (V)	139.972	138.259	135.696	133.949	132.692
Peak Current	I_P (A)	10.945	14.605	21.738	28.845	42.967
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	17.810	24.783	38.859	53.025	81.419
Mechanical Time-constant	T_m (msec)	4.158	3.622	2.860	2.339	1.997
Electrical Time-constant	T_e (msec)	3.586	3.619	3.986	4.528	4.907
Weight	G (Kg)	4.6	5.8	8.2	10.6	15.4
Work Duty	Cont.					
Withstand Voltage	AC1500V，1min					
Insulation Class	F					
Insulation Resistance	DC500V，10MΩMinimum					
Vibration	2.5G Minimum					
Mount Type	Flange					
Struture	Totally-enclosed self cooled					
Altitude	No greater than 1000m					
Ambient temperature	0~40℃（free from condensation）					
Ambient humidity	No greater than 90%RH（free from condensation）					
Storage temperature	-20~60℃（free from condensation）					
Storage humidity	No greater than 90%RH（free from condensation）					

Large- Inertia Servo Motor

Output	P_N (W)	400	550	750	1000	1500
Motor Model		123BL(3) A40-10H	123BL(3) B55-10H	123BL(3) C75-10H	123BL(3) D100-10H	123BL(3) E150-10H

Driver Model		PSDA-0433A8		PSDA-1033A8		PSDA-1533A8
Power	V_{1N} (V)	Three Phase/ Single Phase220VAC （Three Phase 220VAC is recommended）				
Rated Speed	n_N (r/min)	1000				
Rated Torque	T_N (Nm)	3.820	5.252	7.162	9.549	14.324
Max. Torque	T_P (Nm)	11.460	15.756	21.486	28.647	42.972
The Highest Speed	n_P(r/min)	1200				
Velocity & Position Sensor	Optical Encoder with 2500 ppr					
Electrical Potential Coefficient	k_e (Vs/rad)	0.923	0.923	0.923	0.923	0.923
Torquec	k_t (Nm/A)	1.956	1.956	1.956	1.956	1.956
Rotor Inertia	J_r (Kgm^2)	7.2×10^{-4}	9.2×10^{-4}	13.2×10^{-4}	17.2×10^{-4}	25.2×10^{-4}
Resistance Of Armature Winding	R (Ω)	15.897	9.793	5.461	3.695	2.022
Inductance Of Armature Winding	L (mH)	52.863	36.364	22.053	15.719	9.932
Friction & Hysteresis Torque	T_f (Nm)	0.120	0.167	0.199	0.221	0.255
Damping Coefficient	β (Nms/rad)	1.656×10^{-4}	2.042×10^{-4}	2.780×10^{-4}	3.530×10^{-4}	4.090×10^{-4}
Rated Line Current	I_N (A)	1.95	2.69	3.66	4.88	7.32
Rated Line Voltage	V_N (V)	154.987	150.555	143.880	141.865	136.695
Peak Current	I_P (A)	5.796	7.971	10.827	14.367	21.420
Rated Power ‘s Rate of Rise	Q_N (KW/sec)	20.267	29.982	38.859	53.014	81.419
Mechanical Time-constant	T_m (msec)	4.484	3.530	2.824	2.490	1.655
Electrical Time-constant	T_e (msec)	3.325	3.713	4.038	4.254	4.910
Weight	G (Kg)	4.6	5.8	8.2	10.6	15.4
Work Duty	Cont.					
Withstand Voltage	AC1500V，1min					
Insulation Class	F					
Insulation Resistance	DC500V，10MΩMinimum					
Vibration	2.5G Minimum					
Mount Type	Flange					
Struture	Totally-enclosed self cooled					
Altitude	No greater than 1000m					
Ambient temperature	0~40℃（free from condensation）					
Ambient humidity	No greater than 90%RH（free from condensation）					
Storage temperature	-20~60℃（free from condensation）					
Storage humidity	No greater than 90%RH（free from condensation）					

Large- Inertia Servo Motor

Output	P_N (kW)	1.9	3	3.7	4.5	5.5	7.5

Motor Model		192BL(3) A190-10H	192BL(3) B300-10H	192BL(3) C370-10H	192BL(3) D450-10H	192BL(3) E550-10H	192BL(3) F750-10H
Driver Model		PSDA-XXX53A6					
Power	V_{1N} (V)	Three Phase 380VAC					
Rated Speed	n_N (r/min)	1000					
Rated Torque	T_N (Nm)	18.4	28.6	35.8	44.5	54.1	71.6
Max. Torque	T_P (Nm)	55.2	85.8	107.4	133.5	162.3	214.8
The Highest Speed	n_P (r/min)	1200					
Electrical Potential Coefficient	k_e (Vs/rad)	2.0	2.0	2.0	2.0	2.0	2.0
Torquec	k_t (Nm/A)	4.24	4.24	4.24	4.24	4.24	4.24
Rotor Inertia	J_r (Kgm^2)	49.2×10^{-4}	72.3×10^{-4}	95.4×10^{-4}	118.4×10^{-4}	141.5×10^{-4}	176.1×10^{-4}
Rated Line Current	I_N (A)	5.0	7.5	9.0	11.5	13.5	17.5
Peak Current	I_P (A)	15	22.5	27	34.5	40.5	52.5
Weight	G (Kg)	21	26	30	34	38	45

Large- Inertia Servo Motor

Output	P_N (kW)	2.9	4.4	5.5	7.0	8.5	11
Motor Model		192BL(3) A290-15H	192BL(3) B440-15H	192BL(3) C550-15H	192BL(3) D700-15H	192BL(3) E850-15H	192BL(3) F1100-15H
Driver Model		PSDA-XXX53A6					
Power	V_{1N} (V)	Three Phase 380VAC					
Rated Speed	n_N (r/min)	1500					
Rated Torque	T_N (Nm)	18.4	28.6	35.8	44.5	54.1	71.6
Max. Torque	T_P (Nm)	55.2	85.8	107.4	133.5	162.3	214.8
The Highest Speed	n_P (r/min)	1800					
Electrical Potential Coefficient	k_e (Vs/rad)	1.33	1.33	1.33	1.33	1.33	1.33
Torquec	k_t (Nm/A)	2.82	2.82	2.82	2.82	2.82	2.82
Rotor Inertia	J_r (Kgm^2)	49.2×10^{-4}	72.3×10^{-4}	95.4×10^{-4}	118.4×10^{-4}	141.5×10^{-4}	176.1×10^{-4}
Rated Line Current	I_N (A)	7.0	10.5	13	16.3	19.5	25.5
Peak Current	I_P (A)	21	31.5	39	18.9	58.5	76.5
Weight	G (Kg)	21	26	30	34	38	45

Large- Inertia Servo Motor

Output	P_N (kW)	3.8	6	7.5	9.3	11	15

Motor Model		192BL(3) A380-20H	192BL(3) B600-20H	192BL(3) C750-20H	192BL(3) D930-20H	192BL(3) E1100-20H	192BL(3) F1500-20H
Driver Model		PSDA-XXX53A6					
Power	V_{1N} (V)	Three Phase 380VAC					
Rated Speed	n_N (r/min)	2000					
Rated Torque	T_N (Nm)	18.4	28.6	35.8	44.5	54.1	71.6
Max. Torque	T_P (Nm)	55.2	85.8	107.4	133.5	162.3	214.8
The Highest Speed	n_P (r/min)	2400					
Electrical Potential Coefficient	k_e (Vs/rad)	1.0	1.0	1.0	1.0	1.0	1.0
Torquec	k_t (Nm/A)	2.12	2.12	2.12	2.12	2.12	2.12
Rotor Inertia	J_r (Kgm^2)	49.2×10^{-4}	72.3×10^{-4}	95.4×10^{-4}	118.4×10^{-4}	141.5×10^{-4}	176.1×10^{-4}
Rated Line Current	I_N (A)	9.0	14	16.3	21.5	26	35
Peak Current	I_P (A)	27	42	48.9	64.5	78	105
Weight	G (Kg)	21	26	30	34	38	45

Output	P_N (kW)	5.2	7.8	10.5	15.7
Motor Model		280BL(3) A520-10	280BL(3) B780-10	280BL(3) C1050-10	280BL(3) D1570-10
Driver Model		PSDA-XXX53A6			
Power	V_{1N} (V)	Three Phase 380VAC			
Rated Speed	n_N (r/min)	1000			
Rated Torque	T_N (Nm)	50	75	100	150
Max. Torque	T_P (Nm)	150	225	300	450
The Highest Speed	n_P (r/min)	1200			
Electrical Potential Coefficient	k_e (Vs/rad)	2.3	2.3	2.3	2.3
Torquec	k_t (Nm/A)	4.876	4.876	4.876	4.876
Rotor Inertia	J_r (Kgm^2)	330×10^{-4}	495×10^{-4}	660×10^{-4}	990×10^{-4}
Rated Line Current	I_N (A)	10.5	15.5	21	31
Peak Current	I_P (A)	31.5	46.5	63	93

Output	P_N (kW)	10.5	15.7	21	31.4
Motor Model		280BL(3) A1050-20	280BL(3) B1570-20	280BL(3) C2100-20	280BL(3) D3140-20
Driver Model		PSDA-XXX53A6			

Power	V_{1N} (V)	Three Phase 380VAC			
Rated Speed	n_N (r/min)	2000			
Rated Torque	T_N (Nm)	50	75	100	150
Max. Torque	T_P (Nm)	150	225	300	450
The Highest Speed	n_P (r/min)	2400			
Electrical Potential Coefficient	k_e (Vs/rad)	1.15	1.15	1.15	1.15
Torquec	k_t (Nm/A)	2.438	2.438	2.438	2.438
Rotor Inertia	J_r (Kgm^2)	330×10^{-4}	495×10^{-4}	660×10^{-4}	990×10^{-4}
Rated Line Current	I_N (A)	21	31	42	62
Peak Current	I_P (A)	63	93	126	186

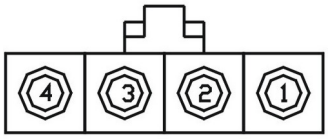
Output	P_N (kW)	7.8	11.8	15.7	23.6
Motor Model		280BL(3) A780-15	280BL(3) B1180-15	280BL(3) C1570-15	280BL(3) D2360-15
Driver Model		PSDA-XXX53A6			
Power	V_{1N} (V)	Three Phase 380VAC			
Rated Speed	n_N (r/min)	1500			
Rated Torque	T_N (Nm)	50	75	100	150
Max. Torque	T_P (Nm)	150	225	300	450
The Highest Speed	n_P (r/min)	1800			
Electrical Potential Coefficient	k_e (Vs/rad)	1.53	1.53	1.53	1.53
Torquec	k_t (Nm/A)	3.25	3.25	3.25	3.25
Rotor Inertia	J_r (Kgm^2)	330×10^{-4}	495×10^{-4}	660×10^{-4}	990×10^{-4}
Rated Line Current	I_N (A)	15.5	23	31	46.5
Peak Current	I_P (A)	46.5	69	93	139.5

4.5 Motor power cord definition

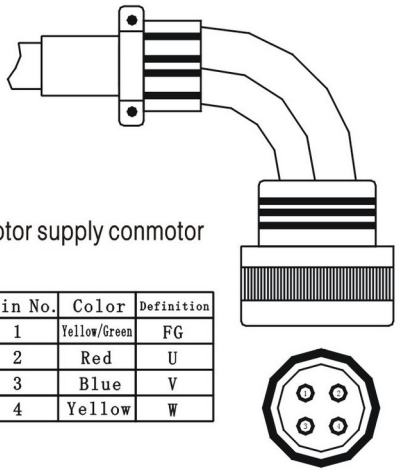
Motor		Symbol							
Motor model	Plug type	**U**		**V**		**W**		**FG**	
		Pin	Colour	Pin	Colour	Pin	Colour	Pin	Colour

40BL(3)~80BL(3)	Plastic 4-cord plug	1	Red	2	Blue	3	Yellow	4	Green/Yellow
92BL(3)~123BL(3)	**Connector**	2	Red	3	Blue	4	Yellow	1	Green/Yellow

motor supply connector



Pin No.	Color	Definition
1	Red	U
2	Blue	V
3	Yellow	W
4	Yellow/Green	FG

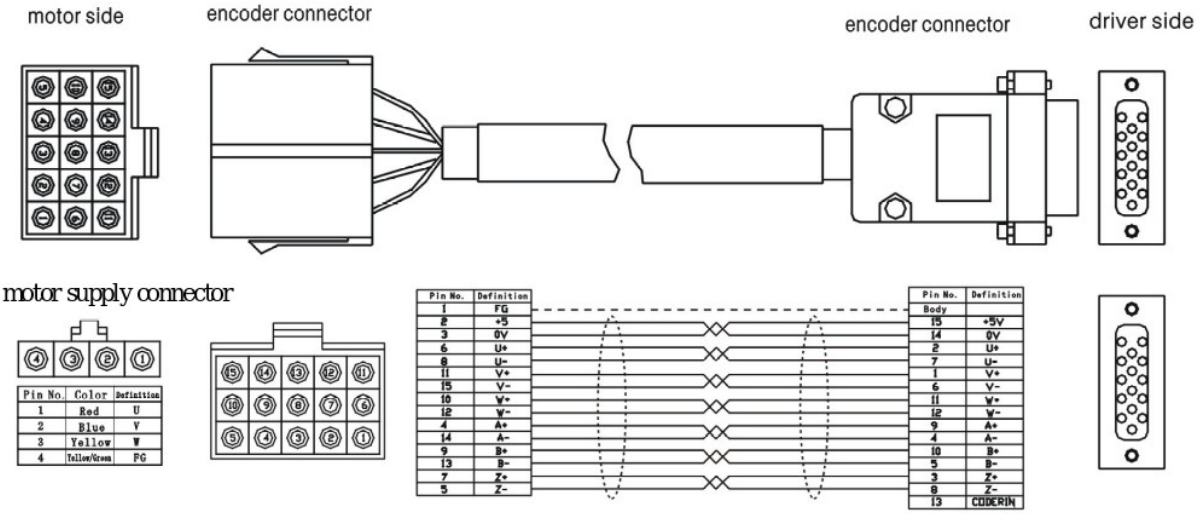


motor supply conmotor

Pin No.	Color	Definition
1	Yellow/Green	FG
2	Red	U
3	Blue	V
4	Yellow	W

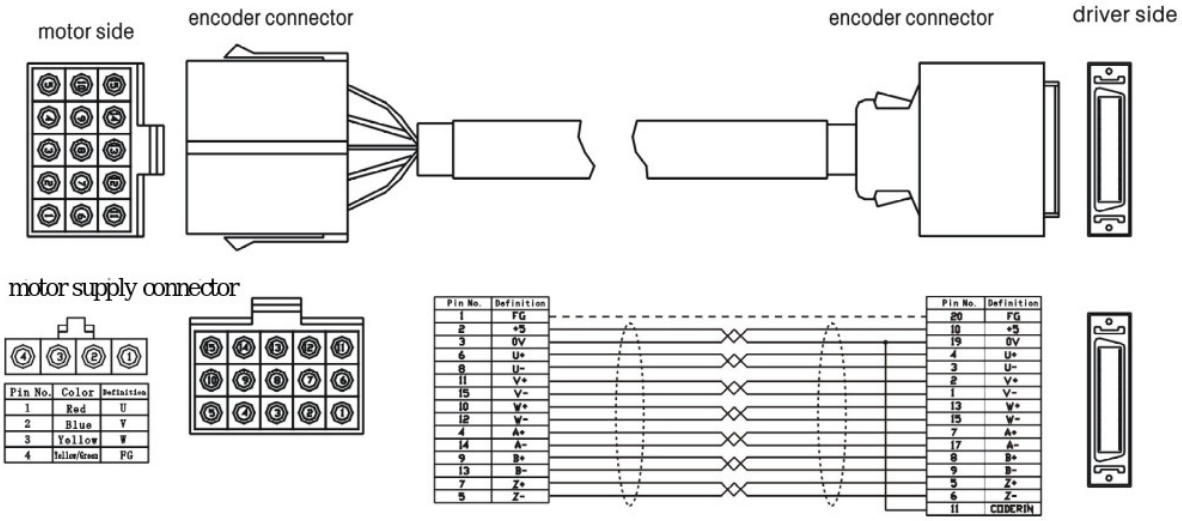
4.6 Motor encoder wire definition

1) On the side of the motor is plastic plug, and on the side of the driver is D-type connector. (The power of the motor is between 30 and 100 watts, and the supply of the driver is DC.)



2) On the side of the motor is plastic plug, and on the side of the driver is SCSI-type connector.

(The motor power is between30 and 750 watts)



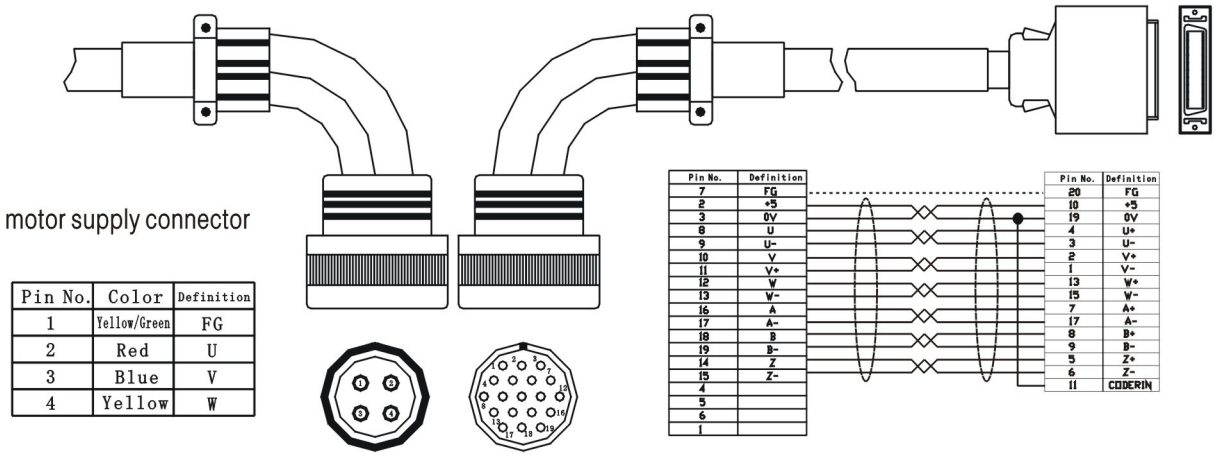
Pin No.	Color	Definition
1	Red	U
2	Blue	V
3	Yellow	W
4	Yellow/Green	FG

Pin No.	Definition
1	FG
2	+5
3	0V
6	U+
8	U-
11	V+
15	V-
10	W+
12	W-
4	A+
14	A-
9	B+
13	B-
7	Z+
5	Z-

Pin No.	Definition
20	FG
10	+5
19	0V
4	U+
3	U-
2	V+
1	V-
13	W+
15	W-
7	A+
17	A-
8	B+
9	B-
5	Z+
6	Z-
11	CODERIN

3) On the side of the motor is plug, and on the side of the driver is SCSI-type connector.

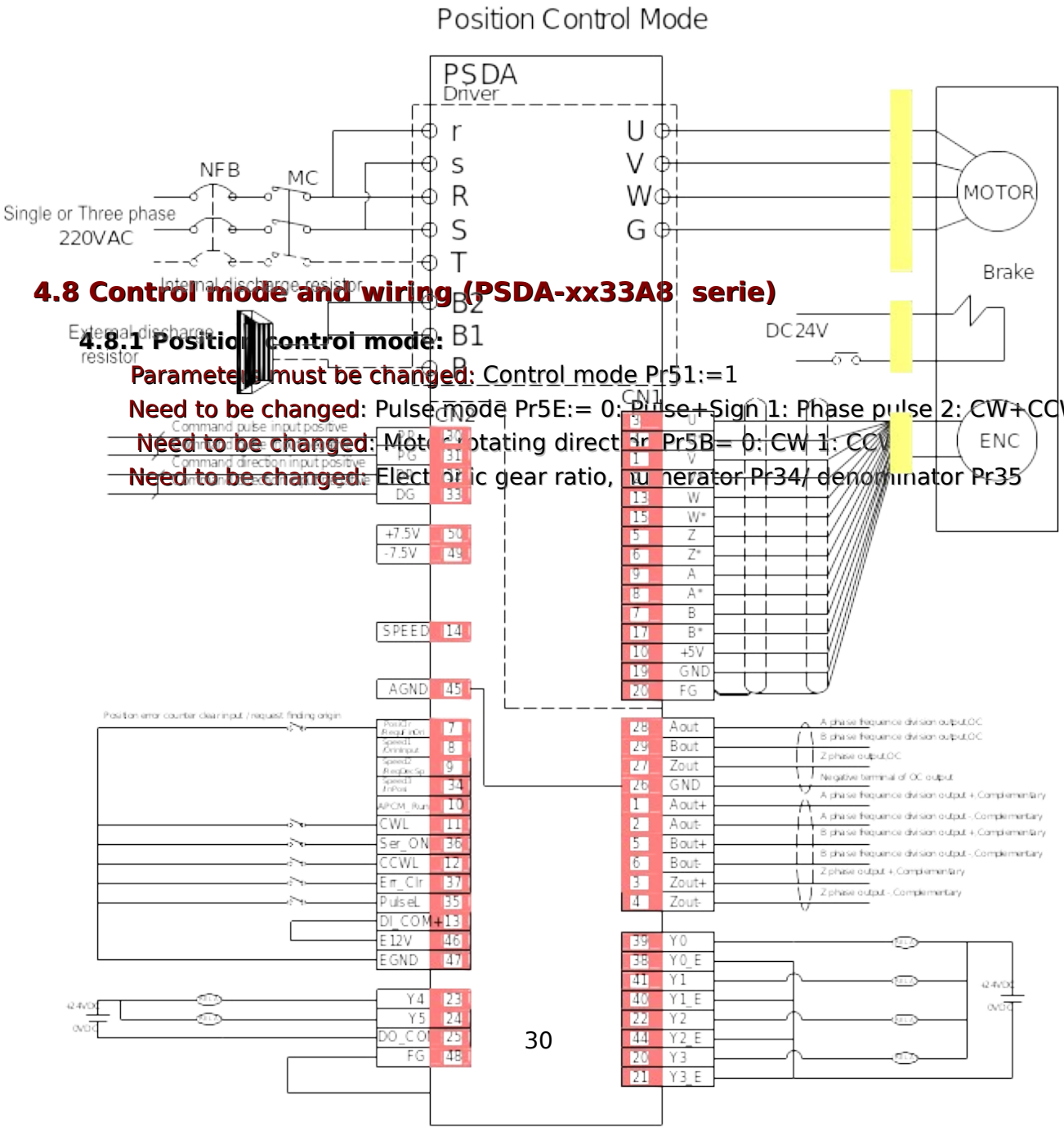
(The motor power is between 1000 and 15000 watts)


motor supply connector
Pin No. Color Definition
1 Yellow/Green FG
2 Red U
3 Blue V
4 Yellow W
Pin No. Definition
7 FG
2 +5
3 0V
8 U
9 U-
10 V
11 V+
12 W
13 W-
16 A
17 A-
18 B
19 B-
14 Z
15 Z-
4
5
6
1
Pin No. Definition
20 FG
10 +5
19 0V
4 U+
3 U-
2 V+
1 V-
13 W+
15 W-
7 A+
17 A-
8 B+
9 B-
5 Z+
6 Z-
11 CODERIN

4.7 Control plug (CN2) pin definition

Pin No.	Symbol	Name	Function	Standard wire
32	DP	DP	Direction positive /CCW+	Grey
33	DG	DG	Direction negative /CCW-	Blue
30	PP	PP	Pulse positive/CW+	Red
31	PG	PG	Pulse negative/CW-	Black
7	X0	Posiclr/requfinori	Position error clear / request finding origin	Grass green
8	X1	Selsp1/orininput	Speed selection 1 / origin input signal	
9	X2	Selsp2/reqdecsp	Speed selection 2/ request deceleration signal	
34	X3	Selsp3/inposi	Speed selection 3 / in-position signal	
10	X4	Apcm-run	APCM run signal	
11	X5	CW	CW over travel inhibit	
36	X6	Ser-ON	Servo on	Green
12	X7	CCW	CCW over travel inhibit	
37	X8	Err-clr	Error clear	Faint grey
43	X9	Torque type	Torque control mode input	
42	X10	NC	NC	
19	X11	NC	NC	
35	X12	Pulsestop	Command pulse input inhibit	
13	DI-COM+	DI-COM+	Anode of common input	Shorted internally
46	E12V	E12V	Internal supply □12V	
47	EGND/DI-COM-	EGND/DI-COM-	Control supply 0V	Yellow
39	Y0	Y0	Position fixed output +	White
38	Y0-E	Y0-E	Position fixed output -	Brown
41	Y1	Y1	Alarm output +	Orange
40	Y1-E	Y1-E	Alarm output -	Violet
22	Y2	Y2	Ready for servo +	
44	Y2-E	Y2-E	Servo-on output emitter	
20	Y3	Y3	NC	
21	Y3-E	Y3-E	NC	
23	Y4	Y4	Brake output +	Pink
24	Y5	Y5	Y5 output collector	
25	DO-COM-	DO-COM-	Output common port□	Faint green
28	Aout	Aout	A phase frequence division output	
29	Bout	Bout	B phase frequence division output	
27	Zout	Zout	Z phase frequence division output	Cerulean
26	GND	GND	Negative terminal of OC output	Faint yellow
1	Aout+	Aout+	A phase frequence division output□	
2	Aout-	Aout-	A phase frequence division output□	
5	Bout+	Bout+	B phase frequence division output□	

6	Bout-	Bout-	B phase frequence division output□	
3	Zout+	Zout+	Z phase frequence division output□	
4	Zout-	Zout-	Z phase frequence division output□	
14	Speed+	Speed+	Analog speed command input+	
15	Speed-	Speed-	Analog speed command input-	
16	Torque	Torque	Analog torque command input	
45	AGND	AGND	Analog ground	
50	+7.5V	+7.5V	Analog voltage□7.5V output	
49	-7.5V	-7.5V	Analog voltage□7.5V output	
48	FG	FG	FG terminal□connected with the frame internally	



4.8 Control mode and wiring (PSDA-xx33A8 serie)

4.8.1 Position control mode:

Parameter must be changed: Control mode Pr51:=1

Need to be changed: Pulse mode Pr5E:= 0: Pulse+Sign 1: Phase pulse 2: CW+CCW

Need to be changed: Motor rotating direction Pr5B= 0: CW 1: CCW

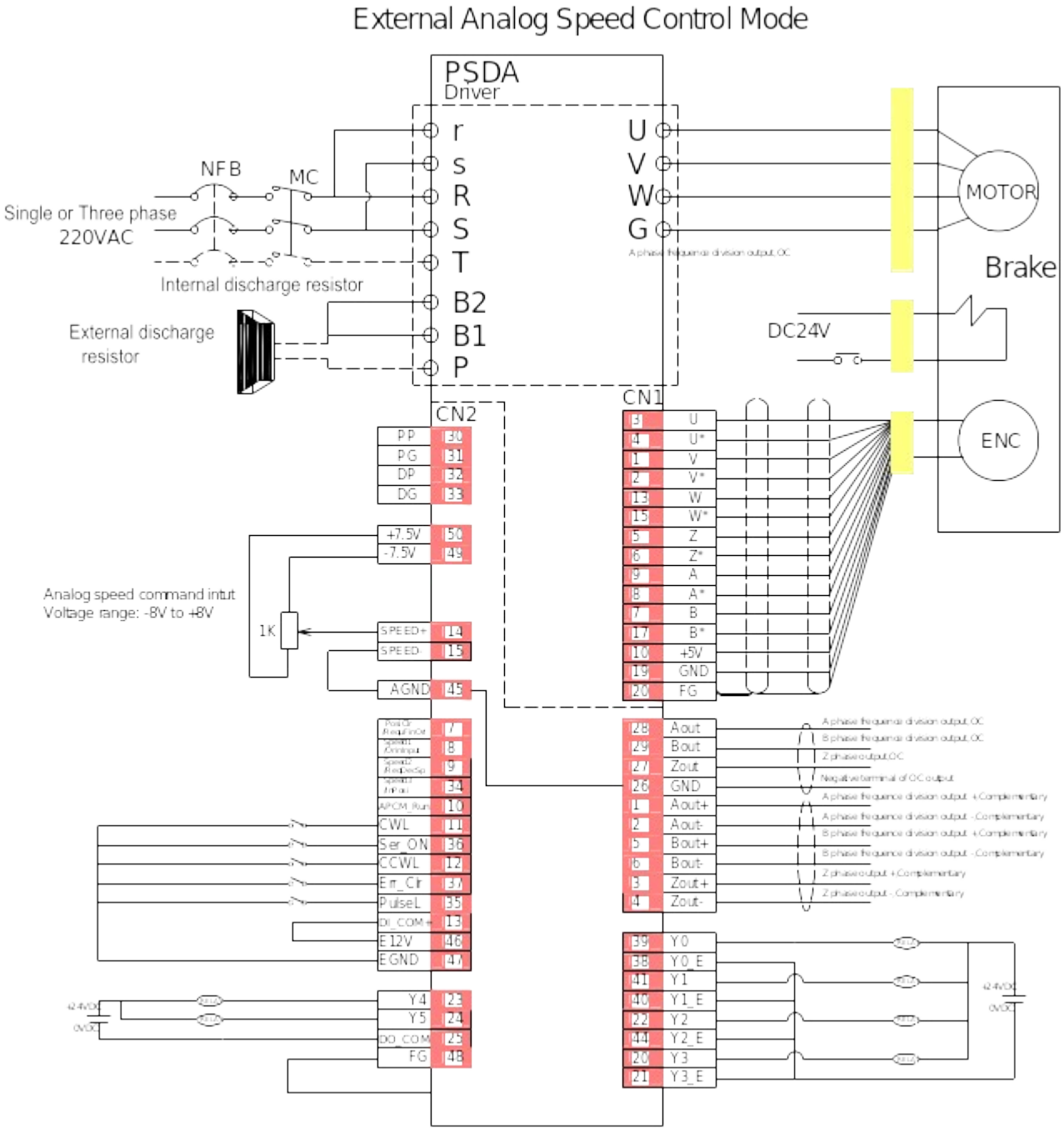
Need to be changed: Electronic gear ratio, numerator Pr34/ denominator Pr35

4.8.2 External Analogue Speed control mode:

Parameters must be changed: Control mode Pr51:=2

Need to be changed: Speed input gain Pr48

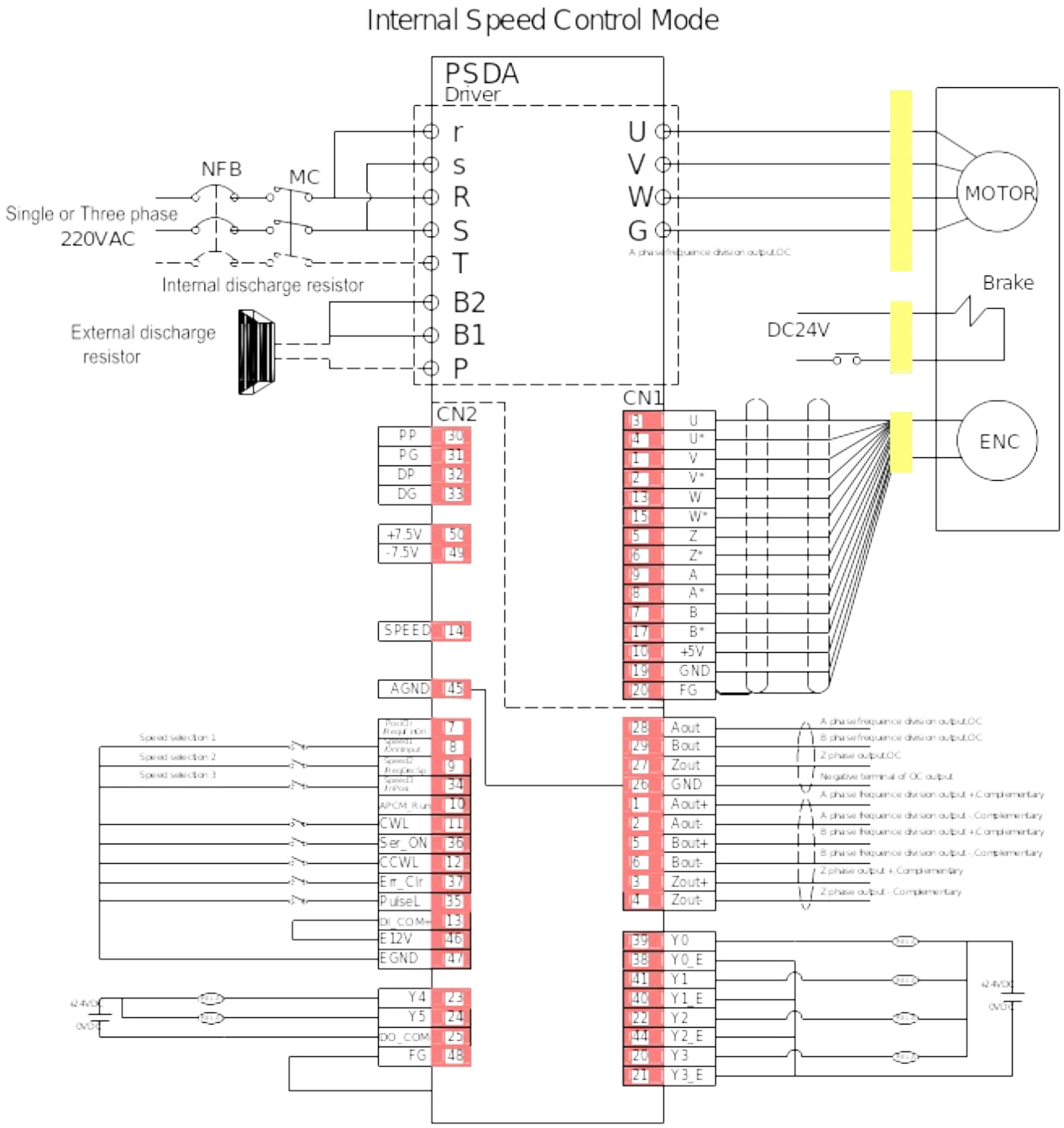
Need to be changed: Motor rotating direction Pr5B= 0: CW 1: CCW



4.8.3 Internal speed control mode:

Parameters must be changed: Control mode Pr51:=0

Need to be changed: Motor rotating direction Pr5B= 0: CW ; 1: CCW

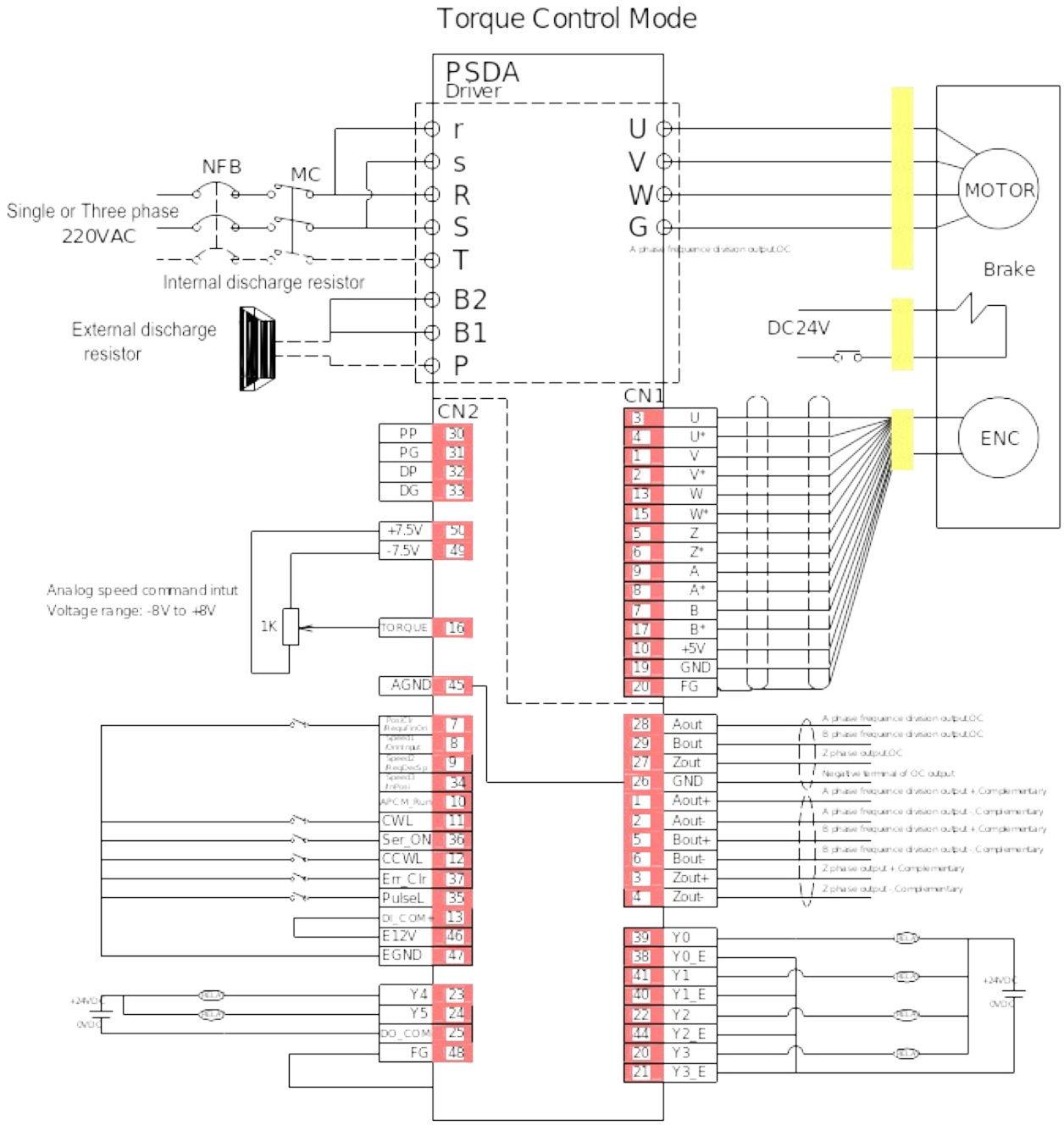


4.8.4 Torque Control Mode:

Parameters must be changed: Control mode Pr51:=3

Need to be changed: Torque input gain Pr4E

Need to be changed: Motor rotating direction Pr5B= 0: CW 1: CCW

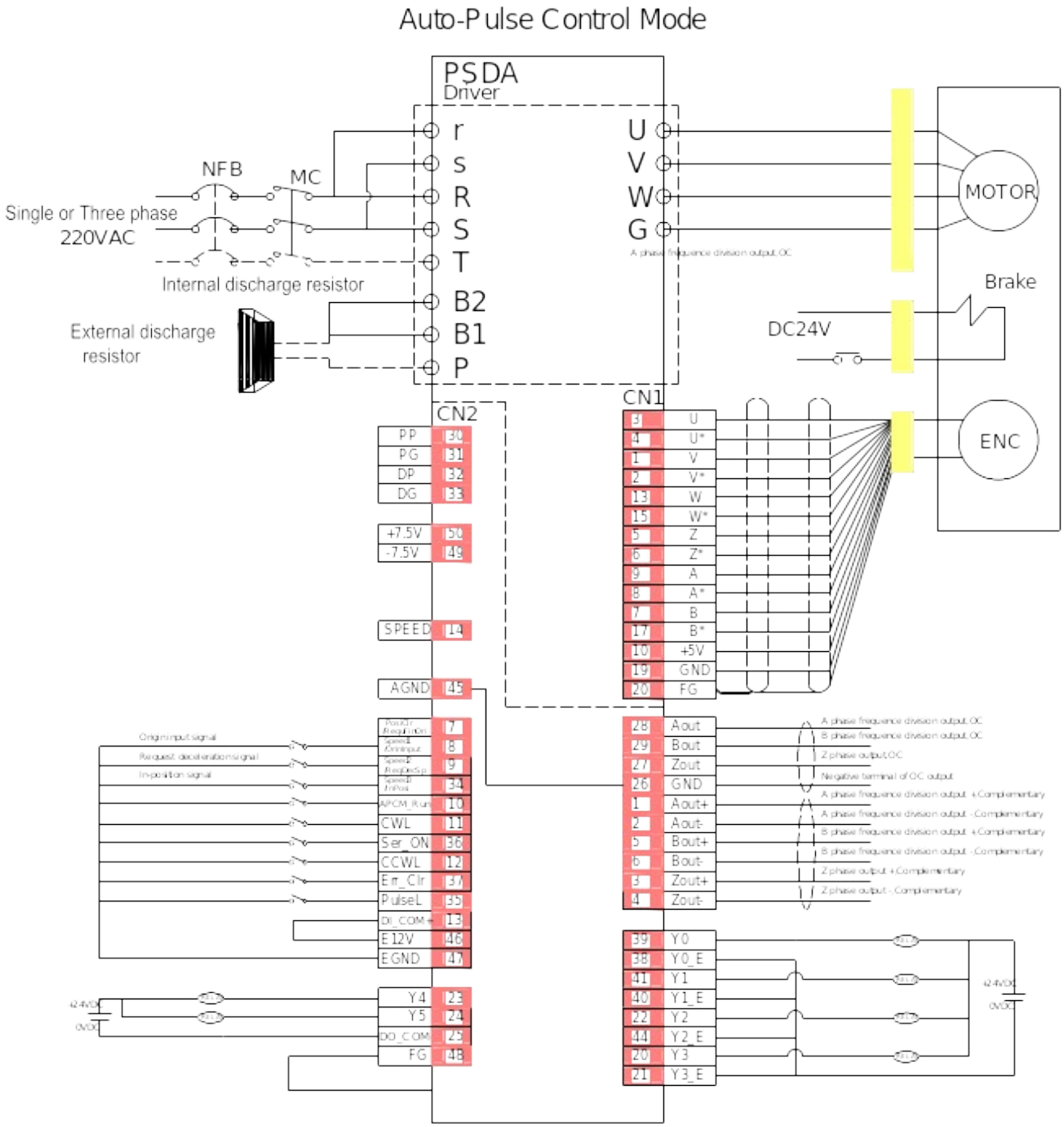


4.8.5 Auto-pulse Control Mode (APCM) :

Parameters must be changed: Control mode Pr51:=3

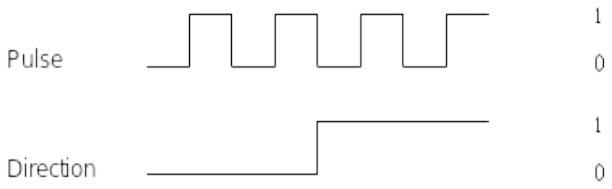
Need to be changed: Torque input gain Pr4E

Need to be changed: Motor rotating direction Pr5B= 0: CW 1: CCW


Auto-Pulse Control Mode
PSDA
Driver
r
s
R
S
T
B2
B1
P
U
V
W
G
NFB
MC
Single or Three phase
220VAC
Internal discharge resistor
External discharge
resistor
MOTOR
Brake
DC24V
ENC
CN2
CN1
PP 30
PG 31
DP 32
DG 33
+7.5V 50
-7.5V 49
SPEED 14
AGND 45
CWL 11
Ser_ON 36
CCWL 12
Err_Clr 37
PulseL 35
DI_COM+ 13
E12V 46
EGND 47
Y4 23
Y5 24
DO_COM 25
FG 48
3 U
4 U*
1 V
2 V*
13 W
15 W*
5 Z
6 Z*
9 A
8 A*
7 B
17 B*
10 +5V
19 GND
20 FG
28 Aout
29 Bout
27 Zout
26 GND
1 Aout+
2 Aout-
5 Bout+
6 Bout-
3 Zout+
4 Zout-
39 Y0
38 Y0_E
41 Y1
40 Y1_E
22 Y2
44 Y2_E
20 Y3
21 Y3_E

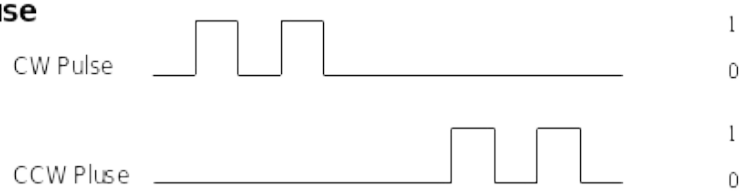
4.9 Pulse input mode

Pulse+Direction



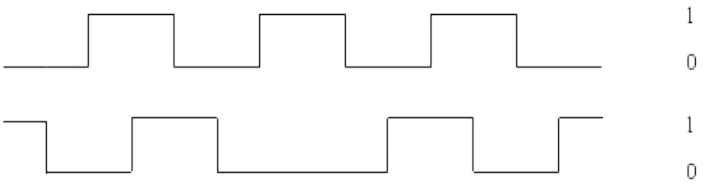
PP- Pulse+, PG- Pluse-
DP- Direction+, DG- Direction-

CW Pulse+CCW Pluse



PP- CW+, PG- CW-
DP- CCW+, DG- CCW-

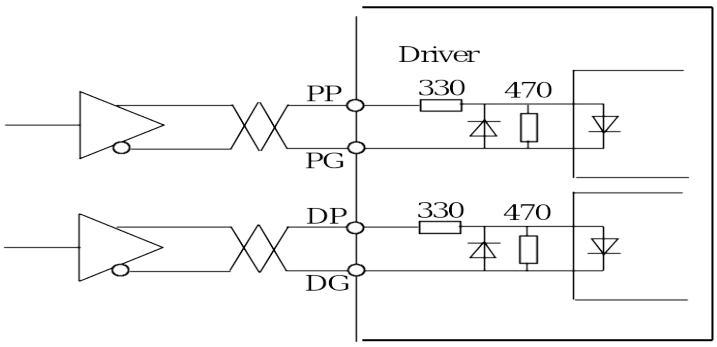
Quadrature Pluse



PP- +, PG- -
DP- +, DG- -

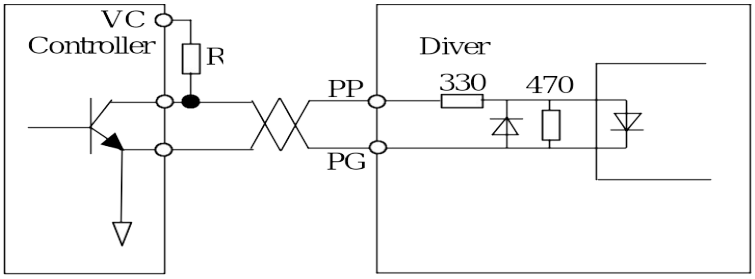
4.10 Pulse input method and wiring diagram

Output of the controller is line driver (proper to long distance and high frequency)



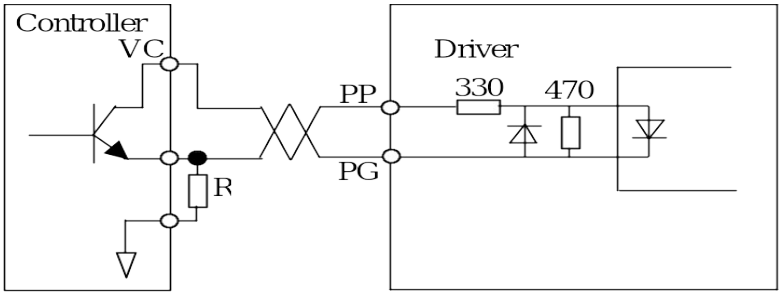
Line driver interface diagram

Output of the controller is open collector



Open collector interface diagram

Output of the driver is emitter follower

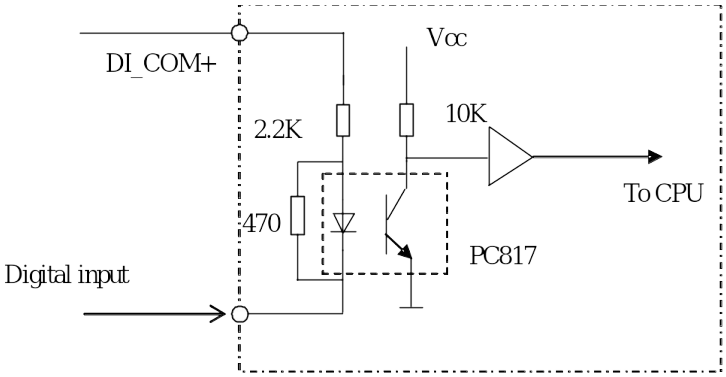


Emitter follower Interface diagram

Note: VC=24V,R=1.2K~1.8K;VC=12V,R=510~820

4.11 Digital Input and Output wiring

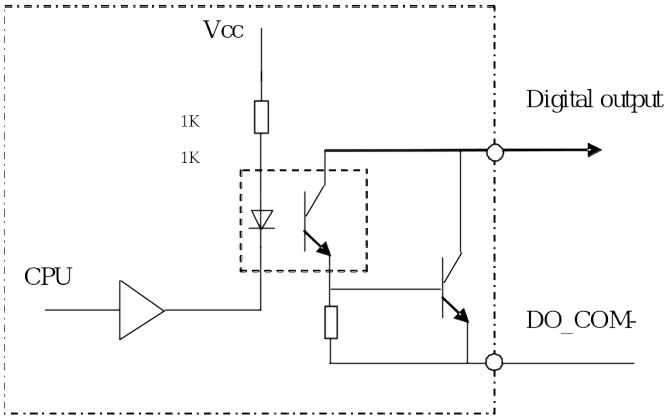
Digital Input



Digital Input interface diagram

Digital Output

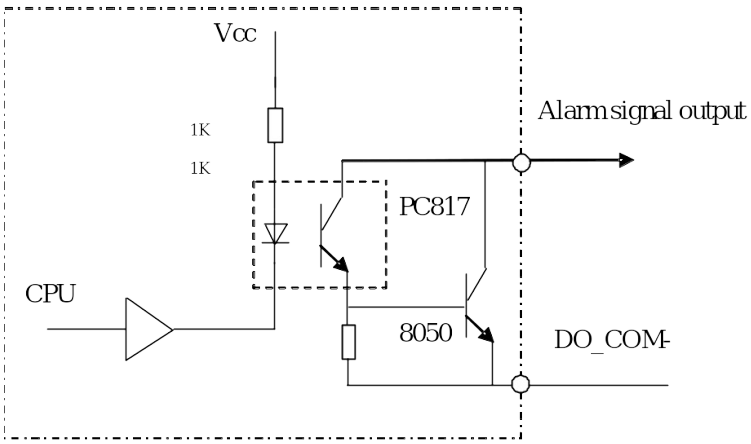
The digital output with the 50mA /50V drives capability.



Digital Output interface diagram

Output signal of alarm and in-position

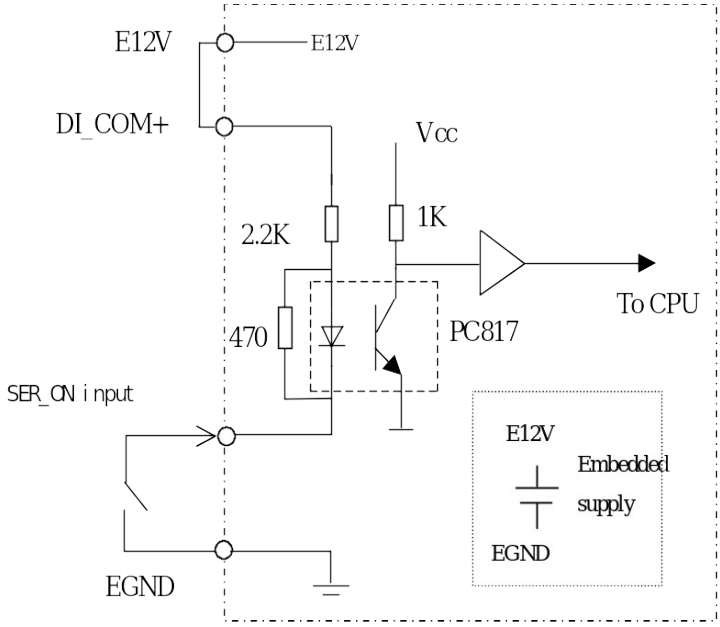
As the difference of the output signal of alarm and in-position from other digital is that it is of stronger driving ability, and it can drive low power relay or load which need stronger driving ability directly.



Alarm and in-position output interface diagram

Adopting the inner 12V power as the interface power

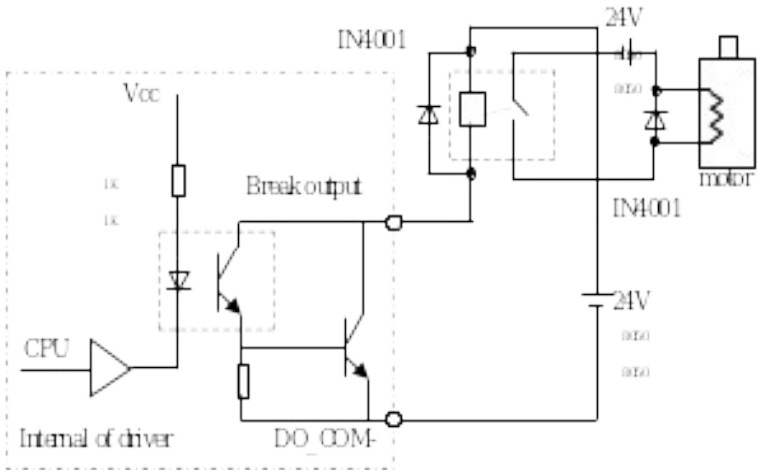
The driver provides an isolated 12V DC supply for the use of the interface. An example of use this supply to interface SER_ON signal is shown as the following. Any other digital input signal can also adopt this method.



Adopting embedded isolated supply as SER_ON signal interface power

4.12 Wiring of hold brake

Hold brake is used for keeping the rotor position, i.e., the motor not to rotate, when the motor is not supplied.



Note：Hold brake is powered by 24V DC supply.

Note：Hold brake is no polarity.

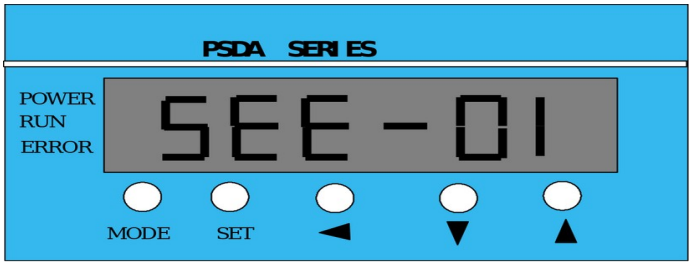
Note：Hold brake cannot be used for slowdown the motor or stop the machine.

Note：The control and drive power of the hold brake are provided by the user.

Note：The surge absorbing diode installed to the DC relay designed for control output should be fitted in the specified direction. Otherwise, the signal is not output due to a fault, disabling the forced stop and other protective circuits.

5. Operation of the driver

5.1 Operation Panel of driver



Area	Name	Symbol	Function
Indicating lamp	POWER Lamp	Power	Power supply proper
	RUN Lamp	Run	Servo on valid, motor locks the shaft, receiving outer command signal is available
	ERROR Lamp	Error	Indicate error information
Number window	Number show window		LED (6 digits), display the status of parameter and run
Keyboard	MODE Button	Mode	Use this button to change work mode
	SET Button	Set	Parameter set button
	◄Button	Shift	Use this button to shift the digit
	▼Button	Decrement	Press this button to decrease the value
	▲Button	Increment	Press this button to Increase the value

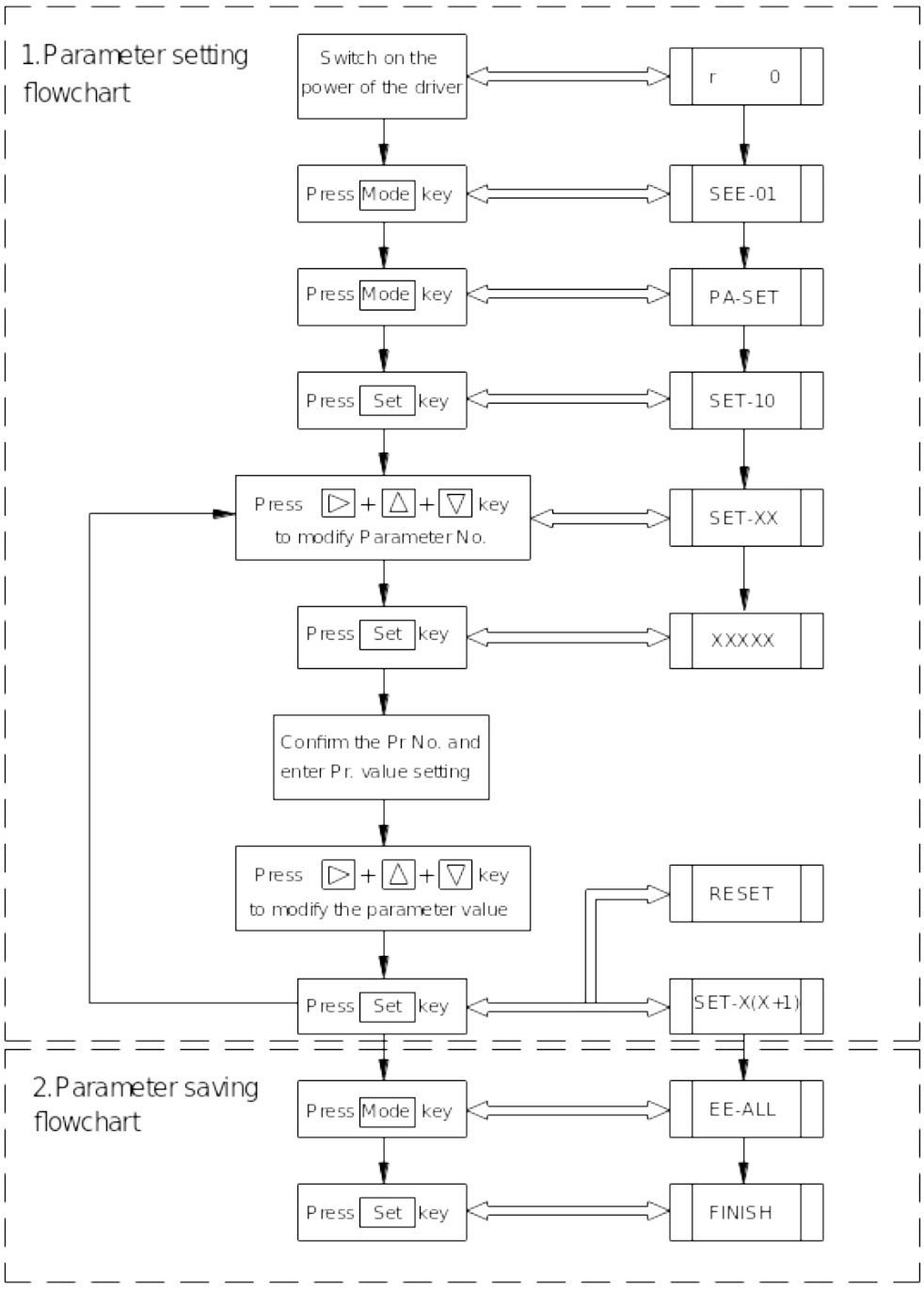
5.2 Operation Mode of the Panel

By MODE Key 5 kinds of mode can be cycle selected

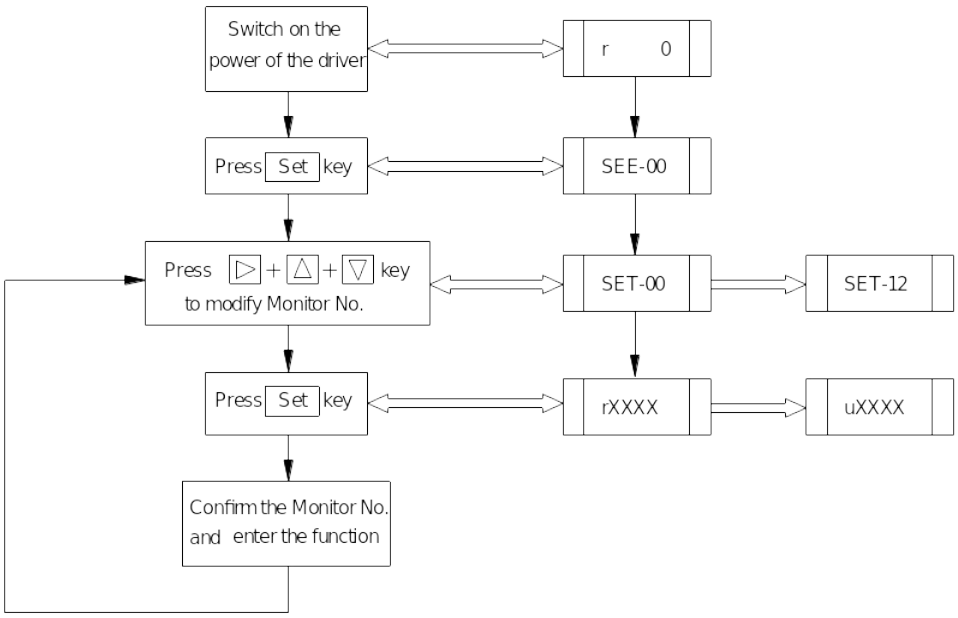
Mode	Symbol	Function
Monitor mode	SEE-01	Select 12 watching items to display, such as current, speed, and so on

Parameter mode	PA-SET	Query or Modify parameters
Data save mode	EE-ALL	Save modified parameters to EEPROM
Auxiliary mode	AF-ENC	Query input or output status, and so on

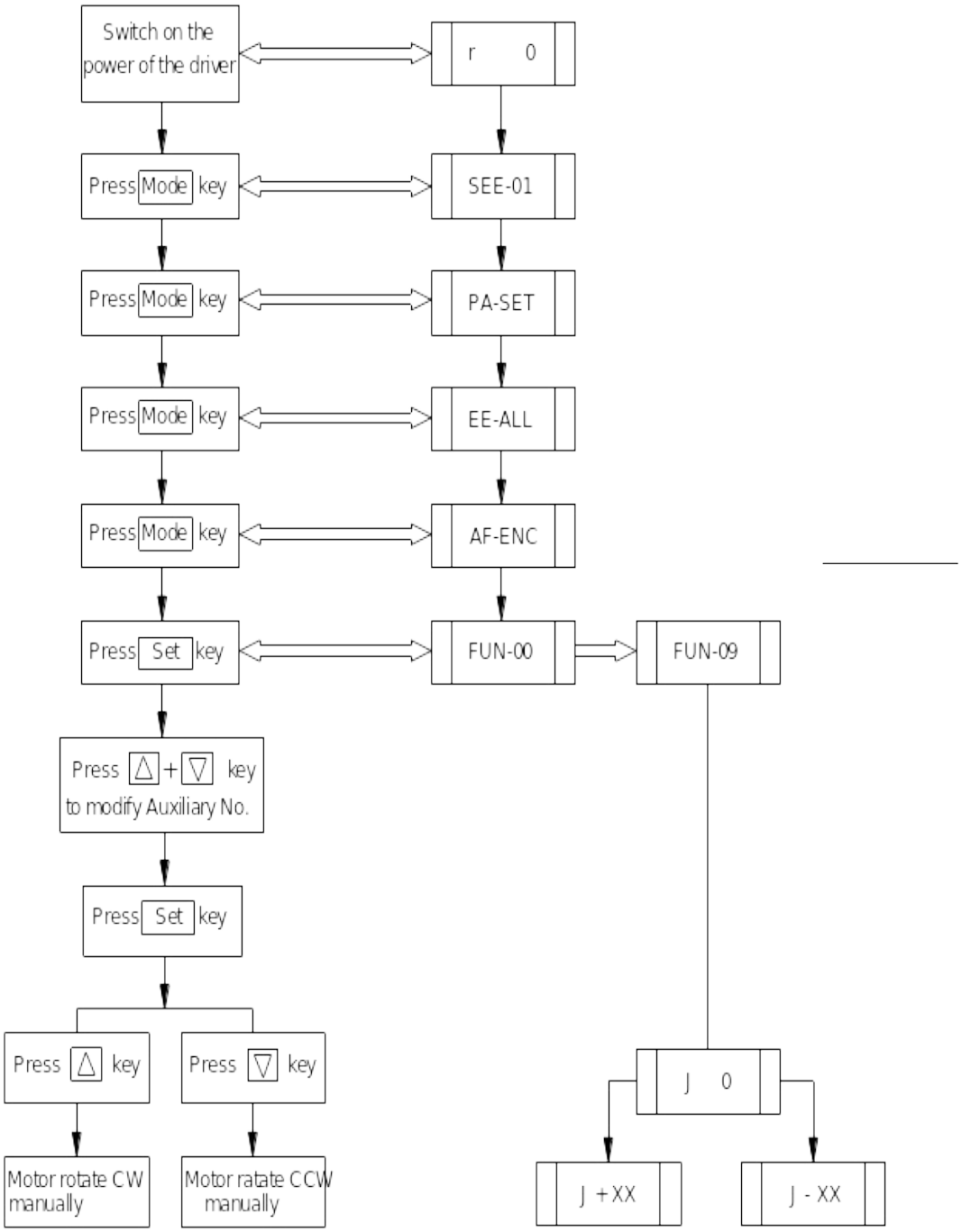
5.3 Parameter setting & saving prodedure


1.Parameter setting flowchart
Switch on the power of the driver
r 0
Press Mode key
SEE-01
Press Mode key
PA-SET
Press Set key
SET-10
Press + + key
to modify Parameter No.
SET-XX
Press Set key
XXXXX
Confirm the Pr No. and enter Pr. value setting
Press + + key
to modify the parameter value
RESET
Press Set key
SET-X(X+1)
2.Parameter saving flowchart
Press Mode key
EE-ALL
Press Set key
FINISH

5.4 Monitor selecting prodedure



5.5 Servo motor’s auxiliary operation and JOG mode procedure



6. Position Mode

6.1 Parameter setting

Para. No.	Parameter description	Range	Reference setting	Instruction
12	Speed observation st ation bandwidth	**200~2500**	**800**	The smaller the value the more obvious inhibitory effect on the noise.Depending on the motor inertia,the principle of inertia to adjust is the larger the inertia the smaller the value.But if too small is easy to cause low-frequency oscillations.The modified parameter values will enable after the next servo on.
15	Adaptive filter torque On-Off	**0~1**	0	It is adaptive filter torque switch for inhibiting high-frequency oscillation and noise.
16	1st wave-trap center frequency	**50~2000**	**100**	used to inhibit the load oscillation.The parameter when the value is setted greater than 1500 is void.The modified parameter values will enable after the next servo on.
17	**1st wave-trap trap width**	**5~1000**	**100**	Width of the 1st wave-trap, the modified parameter values will enable after the next servo on.
18	**2nd wave-trap center frequency**	**50~2000**	**100**	used to inhibit the load oscill ation.The parameter when th e value is setted greater tha n 1500 is void.The modified parameter values will enable after the next servo on.
19	**2nd wave-trap trap width**	**5~1000**	**100**	Width of the 1st wave-trap, t he modified parameter value s will enable after the next s ervo on.
1A	**Gain switch mode**	**0~10**	**0**	0:Fixed 1st gain. 1:Fixed 2nd

				gain. 2:According to the gain switching input pulse frequency. 3:When receiving the speed command use the 2nd gain. 4:When receiving the position command switch gain. 5:the gain switch according to deviation position 6: When positioning did not completeues the second gain 7,8:reserve 9:If speed deviation oversized use a second gain
1B	**Gain switch level**	**0~30000**	**0**	Gain switching condition.
1C	**Gain switch delay time**	**1~30000**	**100**	Gain switching conditions for dealing with redundancy.
1D	**Switch time of position loop high-low Gain**	**1~1000**	**10**	In the use of gain switching mode,motor require the time switching from low gain to high gain.
1E	**Switch time of speed loop high-low gain**	**1~1000**	**10**	In the use of gain switching mode,motor require the time switching from low gain to high gain.
20	1st speed integral time constant	**1~1000**	50	1st speed integral time constant.
21	1st speed loop gain	**20~3500**	300	1st speed loop gain.
22	**2nd speed integral time constant**	**1~1000**	**50**	2nd speed integral time constant.
23	2nd speed loop gain	**20~3500**	**300**	2nd speed loop gain,unit: rad/s□parameter settings depends on motor inertia, inertia the greater the value the greater.
24	**Speedup time of speed mode**	**1~60000**	**100**	The time is that motor accelerate from the rated speed to 0 rpm required at speed or analog control modes given.
25	**Slowdown time of speed mode**	**1~60000**	**100**	The time is that motor decelerate from the rated speed to 0 rpm required at speed or

				analog control modes given.
2C	**Percentage of inertia**	**0~2000**	**1000**	Load moment of inertia relative percentage of the rotor inertia.
2D	**Mechanical rigidity selection**	**0~15**	**5**	Parameter values greater rigidity is stronger, faster response, but the causes too much vibration, adjust the value of the principle of gradual increase in rigidity of the grounds of a smaller effect may be observed.
2E	**Gain adjustment function selection**	**0~2**	1	0: Gain parameters manually adjust the way 1: Gain parameter automatically set by setting the percentage of inertia and rigidity.
2F	**Conventional automatic gain operating mode selection**	**0~7**	0	Conventional automatic gain can be set to run laps when the number and direction of rotation.
31	1st position loop gain	**10~1000**	**100**	1st position loop gain
32	2nd position loop gain	**10~1000**	**100**	2nd position loop gain
33	**Position feedforward percent**	**0~200**	**0**	Position feedforward percent.
34	**Electronic gear ratio of molecular**	**1~60000**	1	Electronic Gear Ratio of Molecular.
35	**Electronic gear ratio of denominator**	**1~60000**	1	Electronic Gear Ratio of Denominator.
36	ACC/DCC time of position mode	0-10000	0	Time acc/dec of position loop.
37	**Selection of pulse command smoothing filter**	**0~32**	0	Selection of pulse command smoothing filter.
38	**Position feedforward moothing time**	**00~3000**	**10**	Position feedforward moothing time
3A	**Pulse number positioning completed**	**0~60000**	**100**	Pulse number positioning completed.

3B	**Smoothing time of positioning completed input**	**0~1000**	**0**	Smoothing time of positioning completed input.
3C	**Torque arrival**	**10~500**	**100**	Torque arrival.
3E	**Center frequency of wave-trap position command**	**50~2000**	**2000**	Center frequency of wave-trap position command.
3F	**Notch width of position command wave-trap**	**5~1000**	**100**	Notch width of position command wave-trap.
40	**1st internal speed**	**-10000~10000**	**100**	1st speed at internal speed mode
…	**……**	**……**	**……**	……
47	**8th internal speed**	**-10000~10000**	**100**	8th speed at internal speed mode
48	**Analog command speed gain input**	**1~1000**	**100**	Analog command speed gain input.
49	**Analog command input zero-drif**	**0~65535**	**0**	Analog command input zero-drif.
4A	**Encoder AB output divider**	**1~15**	**1**	**Encoder AB output divider**
4B	**Clamp speed of analog speed command mode**	**0~1000**	**30**	Clamp speed of analog speed command mode.
4C	**Still servo off keeping break delay time**	**0~1500**	**100**	Still servo off keeping break delay time.
4D	**Running servo off keep break switching delpay time**	**0~1500**	100	Running servo off keep break switching delpay time.
4E	**Analog command input smoothing time**	**0~3000**	1000	Analog command input smoothing time
50	**Selection of IO mixed control mode**	**0~99**	0	Selection of IO mixed control mode

51	Control mode	0～5	1	0:Speed mode,1:Position mode 2:Analog speed mode 3:Fix mode 4:Step touch speed mode 5:LPCM 6:Communication control mode 7:internal use 8:CanBus synchronization mode.Parameter is effective after next servo on.
52	**RS232 baud rat**	0～3	2	0～9600Bps 1～38400Bps 2～57600Bps 3～115200Bps 4～19200Bps
54	**Servo off delay time**	**0~10000**	0	Servo off delay time.
5B	Rotating direction inverse	0～1	0	0～normal 1～rotating direction inverse
5E	Command pulse input mode	0～2	0	0～pulse + sign pulse : PP-positive～PG～negative direction: DP ～ positive ～ DG ～ negative 1～90 degree two-phase PP, PG ～ pulse positive & negative DP, DG ～ pulse positive & negative 2～CW/CCW (OPTIONAL) PP, PG-CW pulse positive & negative DP,DG-CCW pulse positive & negative
60	Password of parameter setting	0～65535	5678	Pr60:=5678, setting is permitted
61	**Machine number**	**0~255**	**1**	Machine number.
62	**CanBus baud rate**	**0~8**	1	0:20K 1:50K 2:125K 3:250K 4:500K 5:1M 6:1.25M 7:1.786M 8:2M
63	**Alarm number of pulse deviation oversized**	**0~30000**	**100**	Alarm number of pulse deviation oversized
65	**CanBus control wor**	**0~65535**	0	CanBus control word

	d			
66	**Servo on delay time**	**100~10000**	**500**	Servo on delay time
6A	**Voltage switching output energy percent**	**10~100**	**80**	Voltage switching output energy percent.
6C	**Torque at time**	**0~3500**	**100**	Torque at time
6E	**Keep break abnormal detection time**	**0~60000**	0	Keep break abnormal detection time.
6F	**Keep break abnormal over-current**	**50~500**	0	internal use.
72	**Jog speed**	**10~10000**	100	The motor speed in use of Jog mode.
73	**Max speed limit**	**100~12000**	**3600**	The maximum speed motor running allowed, when the motor actual speed exceeds the value of this parameter will alarm.

6.2 Parameter adjustment procedure of position mode

Step 1: According to the system requirements, set control mode. Pr51

parameter	Name	Value	Function	Default	Remarks
51	Control mode	0	0：internal speed mode	1	Write to EEPROM, taking effect after power on again.
		1	1：position mode		
		2	2：external analog speed mode		
		3	3：torque mode		
		5	5：APCM mode（embedded PLC）		

Step 2: According to the output type of the controller, set pulse input mode.

Pr5E

parameter	Name	Value	Function	Default	Remarks
5E	Pulse mode	0	0：pulse + sign	0	Write to EEPROM, taking effect after power on again.
		1	1：90 degree two phase		
		2	2：CW+CCW		

Step 3: According to the required direction, set rotating direction inverse. Pr5B

parameter	Name	Value	Function	Default	Remarks
5B	Rotating direction inverse	0	0：normal	0	Write to EEPROM, taking effect after power on again.
		1	1：inverse		

Step 4: According to the load, mechanical, the highest pulse frequency of the controller, set electronic gear numerator and denumerator, Pr34, Pr35.

parameter	Name	Value	Function	Default	Remarks
34	Electronic gear numerator	1~60000	Command pulse frequency multiplication	1	Write to EEPROM, taking effect after power on again.
35	Electronic gear denumerator	1~60000	Command pulse frequency division	1	

Example：Require resolution of 500 pulses per round, then set Pr34:=20, Pr35: 1.

Step 5: According to the load, mechanical, run speed and performance, set speed and position loop gain.

parameter	Name	Value	Function	Default	Remarks
20	1st speed integral time constant	1~1000	Adjust velocity loop response	50	Parameter of velocity loop
21	1st speed loop gain	20~3500	Adjust velocity loop rigidity	300	Parameter of velocity loop
22	2nd speed integral time constant	1~1000	Adjust velocity loop response	50	Parameter of velocity loop

23	2nd speed loop gain	20~3500	Adjust velocity loop rigidity	300	Parameter of velocity loop
31	1st position gain	10□1000	Adjust position loop rigidity	100	Parameter of position loop
32	2nd position gain	10□1000	Adjust position loop rigidity	100	Parameter of position loop

Gain adjustment procedure of position mode

Adjust velocity loop first, then position loop

1: Increase the value of Pr21,Pr23 (velocity loop gain) gradually, until the motor (machine) does not generate abnormal sound and vibration, and the speed is stable.

- **The value larger, the gain higher, and the speed response faster.**
- **Parameter setting should refer to the load. Generally, the load inertia is larger; the setting value should be larger.**
- **Suggest that if only the system doesn't appear shock and the noise is acceptable, the parameter should be as high as possible.**

2: Increase the value of Pr20,Pr22 (velocity loop integration time constant), until the motor (machine) does not generate abnormal sound and vibration, and the speed is stable.

- **The value larger, the speed errors integration faster, and the rigidity of velocity loop larger.**
- **Parameter setting should refer to the load. Generally, the load inertia is larger; the setting value should be smaller.**
- **Suggest that if only the system doesn't appear shock, the parameter should be as large as possible.**

3: Set the value of Pr32 (2nd position loop gain) properly, to ensure the load in good working order with the system running, and the servo motor will not shock in running.

4: Set the value of Pr31 (1st position loop gain) properly, to ensure the load in good working order with the system station, and the servo motor will not shock in stopping.

- **The value larger, the gain larger, and the rigidity higher.**
- **Parameter setting should refer to the load.**
- **Suggest that if only the system doesn't appear shock, the parameter should be as large as possible.**

Note: Parameter setting should refer to the load. If a load is of a significant difference from another one, the parameter should be adjusted correspond.

Note: During adjugement, if a shock occurs, release the servo-on signal or switch off the power as soon as possible. Then decrease the value and try again.

7. Parameter setting on hold brake

parameter	Name	Value	Function	Default	Remarks

4C	**Still servo off keeping break delay tim**	0□1500	Defines the duration from OFF of the brake release signal (BRKOFF) (i.e. brake engaged) to the shutdown of motor current (servo free) in transition to Servo-OFF during the halt of the motor.	100	Delay time
4D	**Running servo off keep break switching delp ay time**	0□1500	Defines the duration from OFF of the brake release signal (BRKOFF)(i.e. brake engaged) to the shutdown of motor current (servo free) in transition to Servo-OFF during the motor in motion, not during the halt as handled by Pr4C.	100	Delay time
66	Servo on delay time	**100~10000**	Define the duration from ON of the brake close signal (BRKON) (i.e. brake set free) to the power on of motor current (servo lock) in transition to Servo-ON	500	Delay time

8. Alarm description, possible cause and corrective action

The PSDA driver has various protective functions. When one of the protections is activated, the motor trips according to the timing chart, and the Servo Alarm Output (ALM) is turned off.

Actions to be taken after trip events

• After a trip event, the LED touch panel displays an alarm code no., and no Servo-ON occurs.

• Any trip status is cleared by keeping A-CLR (Alarm Clear Input) on for at least 120 ms after A-CLR off.

•The overload protection can be cleared by A-CLR at least 10 seconds after the occurrence of the event. If the control power connection between r and t is opened, the time limiting operation is cleared.

• The alarms mentioned above can also be cleared with the LED touch panel.

Notes: Protections marked with * cannot be cleared with A-CLR (Alarm Clear Input). They should be cleared by turning the power off, removing the causes, and then turning the power on again

.

Code	Protection	cause	Corrective action
Err□01	Over current	The current flowing in the converter is larger than the specified value. 1) The driver failed (due to defective circuits or IGBT parts). 2) Motor wires (U, V and W) are shorted. 3) Motor wires (U, V and W) are grounded. Motor burned 5) Poor connection of Motor wires 6) The relay for the dynamic brake is melted and stuck due to the free quent Servo-ON/OFF. 7) The motor is not compatible with the driver.	1) Disconnect the motor wires, and enter Servo-ON. If this trouble happens immediately, replace the driver with a new one (that is working correctly). 2) Check if the U. V and W wires are shorted at the connections. Reconnect them, if necessary. 3) Measure the insulation resistance between U/V/W and earth wire. If the resistance is not correct, replace the motor with a new one. 4) Measure the resistance between U, V and W. If they are unbalanced, replace the motor with a new one. 5) Check if the U/V/W connector pins are firmly secured with screws. Loosened pins should be fixed firmly. 6) Replace the driver with a new one. Do not start or stop the motor by entering Servo-ON or OFF. 7) Check the capacity of the motor and driver on the nameplate. If the motor is not compatible with the driver, replace it with a correct one.
Err□02	Over voltage	The line voltage is larger than the specified acceptable range, so that the P-N voltage of the converter is larger than the specified value, or the line voltage was raised by a condensive load or UPS (Uninterruptible Power Supply). 1) The internal regenerative discharge resistor is disconnected. 2) The eternal regenerative discharge resistor is not suitable so that regenerative energy cannot be absorbed. 3) The driver (circuit) failed.	Measure the terminal-to-terminal voltages (between R, S and T). Remove the causes. Feed a power of correct voltage. 1) Measure the P-B2 resistance of the driver using a circuit tester. If it read .Aa, the connection is broken. Replace the resistor. Insert an external regenerative discharge resistor between the P and B1 terminals. . 2) Use a resistor having the specified resistance for specified Watt.

			3) Replace with a new driver (that is working correctly for another axis).
Err□03	Under voltage	The P-N voltage of the main power converter is lower than the specified value during servo-ON. 2) The main power line voltage is too low, an instantaneous outage occurred, the power source is too small, the main power is turned off, or the main power is not fed. 3) Too small power source: the line voltage dropped due to the inrush current at power On.	Measure the terminal-to-terminal voltages (between R, S and T). 1) Increase the capacity of the main power or replace it with a larger one. Or remove the causes of the failure of the magnetic contact, and then restart the power source. 2) Increase the capacity of the main power. For the required capacity. 3) Correct the phase (R, S and T) connections of the main power. 4) Check the timing of power-on (for both the main power and control power).
Err□04	Over heat	The radiator is heated up to exceed the limit temperature. The power elements of the driver are overheated. Overload.	The heat sink is heated up to exceed the limit temperature. The power elements of the driver are overheated. Overload.
Err□06	Encoder error	1. Encoder is damaged. 2. Encoder is not well connected with the driver.	1. Check encoder. 2. Check wiring.
Err□07	EEPROM read / write error	1) The data contained in the parameter storage area of the EEPROM is broken, so erroneous data is retrieved. 2) The check code of the EEPROM is broken, so erroneous data is retrieved.	Set all the parameters again. If this error occurs frequently, the driver may have been broken. Replace the driver with a new one. Return the old driver to the sales agent for repair. The driver may have been broken. Replace the driver with a new one. Return the old driver to the sales agent for repair.
Err□08	Parameters initiation fault		
Err□09	No encoder	1□Encoder cable is not connected. 2□Encoder cable may be broken.	1□Re-connect encoder cable. 2□Check encoder cable.
Err-10	Baud rate error	The driver checked wrong baud rate setting, and changes the setting to 57600BPS automatically.	Reset the baud rate according to parameter table.
Err□11	position error too large	1) The motor velocity exceeds the specified limit. 2) The position error pulse is larger than Pr63 (position error limit). The motor operation does not respond to the commands.	1) Decrease the target speed (command values). 2) Adjust the electronic gear ratio so that the frequency of the command pulse is 500 kpps or less. If an overshoot occurs, readjust the

			gains. Correct the encoder wiring per the wiring diagram. Check whether the motor operates per the position command pulse or not. See the torque monitor to check if the output torque is saturated. Readjust the gains. Maximize the value of Pr12 (torque limit set-up). Correct the encoder wiring per the wiring diagram. Increase the acceleration and deceleration time. Reduce the load and velocity.
Err□12	CW over-travel limits	The CW over-travel limits is not Active.	Check the switches, wires and power supply that constitute the circuits... Check the value of Pr59. Correct the wiring, if necessary.
Err□13	CCW over-travel limits	The CCW over-travel limits are not Active.	
Err□14	Overload	Overload protection is activated via the specified time limiting operation when the integration of a torque command exceeds the specified overload level. Caused by a long operation with a torque that exceeds the specified torque limit. 1) Long operation with more load and Torque than the rating. 2) Vibration or hunting due to incorrect gains. Cause vibration and/or abnormal sound. 3) Motor wires connected wrong or broken 4) The machine is hit against a heavy hing, or suddenly becomes heavy in operation. The machine is en tangled. 5) The electromagnetic brake is ON. 6) In a system of multiple drivers, some motors are wired incorrectly to other axis.	Monitor the torque (current wave) using an oscilloscope to check whether the torque is surging or not. Check the load factor and overload alarm messages. 1) Increase the capacity of the driver and motor. Lengthen the ramp time of acceleration/ deceleration. Reduce the motor load. 2) Readjust the gains. 3) Correct the motor wiring per the wiring diagrams. Replace cables. 4) Free the machine of any tangle. Reduce the motor load. 5) Measure the voltage at the brake wiring connections. Turn off the brake. 6) Correct the motor and encoder wiring to eliminate the mismatching between the mo.
Err□15	Module Fault		If power on again and the fault is still existence, please replace with a new driver.
Err□16	Energy switching timeOut	The line voltage is larger than the specified acceptable rang	

Err□18	Encoder zero emendation error	The encoder feedback singal is wrong	Check the connector,or chang an encoder
Err□19	An error of current detection		
Err□20	Motor over speed		
Err□21	Speed windage oversized alarm		
Err□22	Encoder communicatio n data error		
Err□25	Motor keep break abnormity		
Err□28	Canbus communicatio n timeout		
Err□29	Canbus synchronizatio n pulse windage oversize		
Err□30	Overflow of driver run accredit		
Err□31	Soft protect because over curren		
Err□32	Current alarm can't be clear		

9. Annexed table

9.1 Monitor mode

Monito r item	Monitor content	Display format	Instruction
00	Motor speed	□±XXXX	+: CW □: CCW xxxx actual speed

01	Reference speed	n±XXXX	+: CW □: CCW xxxx reference speed
02	Instant current A	a±XXXX	+: CW □: CCW xxxx phase U current
03	Instant current B	b±XXXX	+: CW □: CCW xxxx phase V current
04	Current	I±X.XXX	+: CW □: CCW xxx.x winding current
05	Reference current	F±X.XXX	+: CW □: CCW x.xxx reference current
06	Position error	EXXXXX	E: error□XXXXX position error in pulses (10000ppr)
07	Torque in percent	tXXXXX	T: torque in percent XXXXX value
08	Zero point position of encoder	oXXXXX	O: Zero position□XXXXX value
09	Rotor position	PXXXXX	P: rotor position□XXXXX value
10	UVW status of encoder	H0000X	H: UVW status of encoder□X: UVW status□example X=3□means U, V:= 0, W:=1
11	Heat sink temperature	C000XX	C: heat sink temperature XX value
12	Inverter bridge voltage	UXXXX.X	U: inverter DC bridge voltage□XXXX.X value
13	Reference pulses	• XXXXXX	Display the pulses received currently, • : show negative pulses No •: show positive pulse

9.2 Auxiliary function

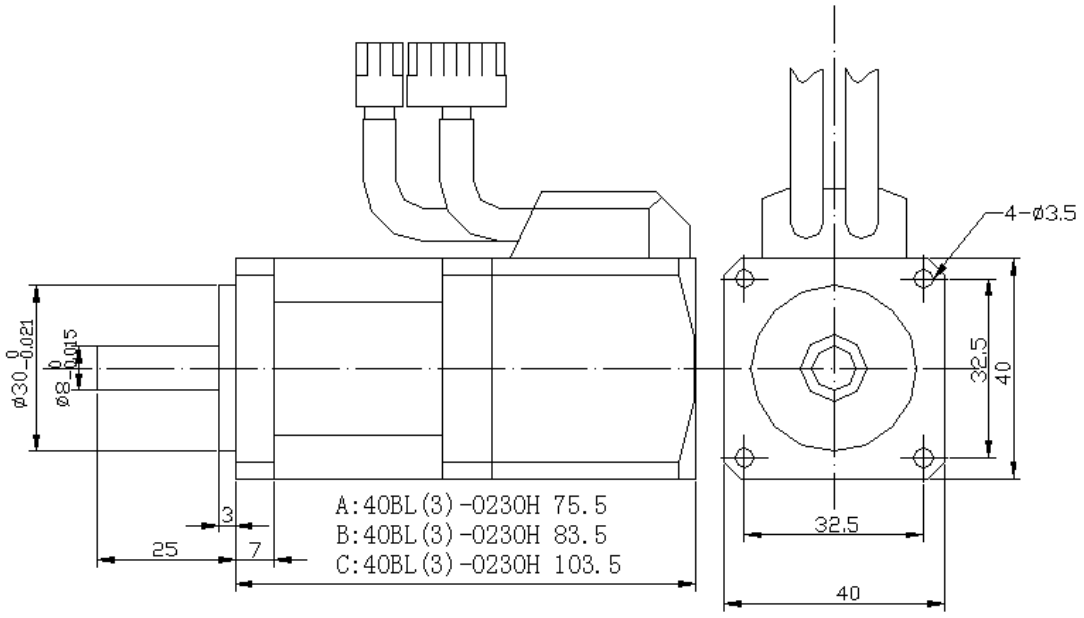
Auxiliary function No.	Symbol	Function
0	AF-ENC FUN-00	Query digital input / output status. Such as Servo-on, CW and CCW inhibit, and so on.
1	AF-ENC FUN-01	Query alarm information.
2	AF-ENC FUN-02	Query serial number.
3	AF-ENC FUN-03	Input authorized code.
4	AF-ENC FUN-04	Reset all the parameters to the default value.
8	AF-ENC FUN-08	Put the currently setting parameter as the default to save in the driver.
9	AF-ENC FUN-09	JOG function. For trial operation.

10. Servo motor parameter adjustment and system analyze application software

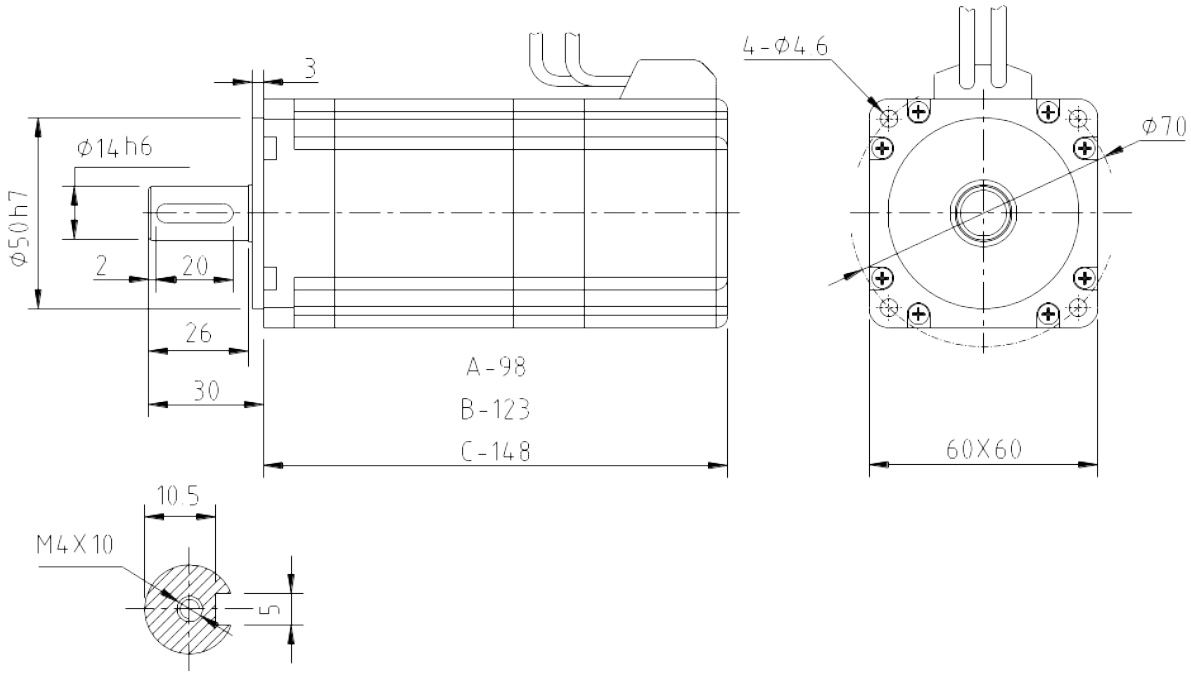
- Standard windows interface, operating conveniently
- Setting parameters visualize, optional decimal system and hexadecimal system
- All setting parameters can be backup to computer, and the parameters in computer can also be leading in the driver
- The setting parameters can be writed in memory or EEPROM immediately
- Two path of real-time data collecting curve displaying
- Observe curve of command reference speed, actual speed, reference current, actual current real-time
- Save the wave of data collecting curve, and display the saved curve for analyzing again
- Set trigger condition
- Directly operate the status of the driver’s switching value

◆ Directly oberserve the value in driver status register

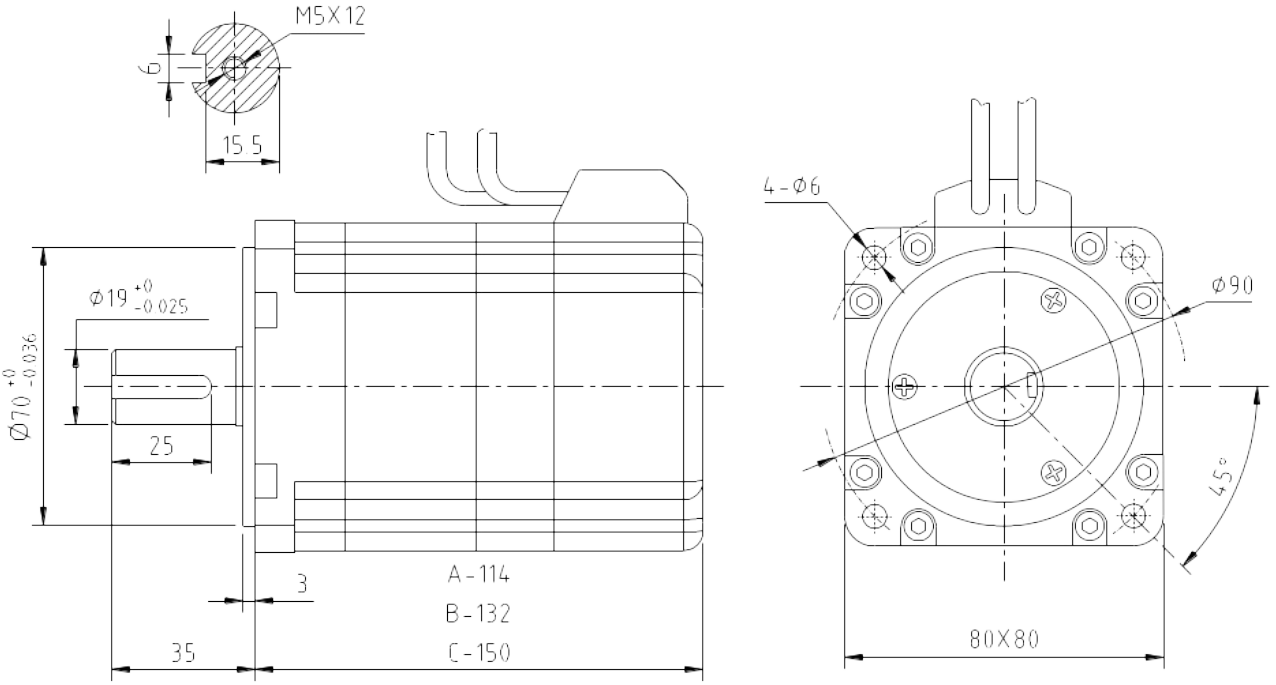
Dimensions of 40 Series motor



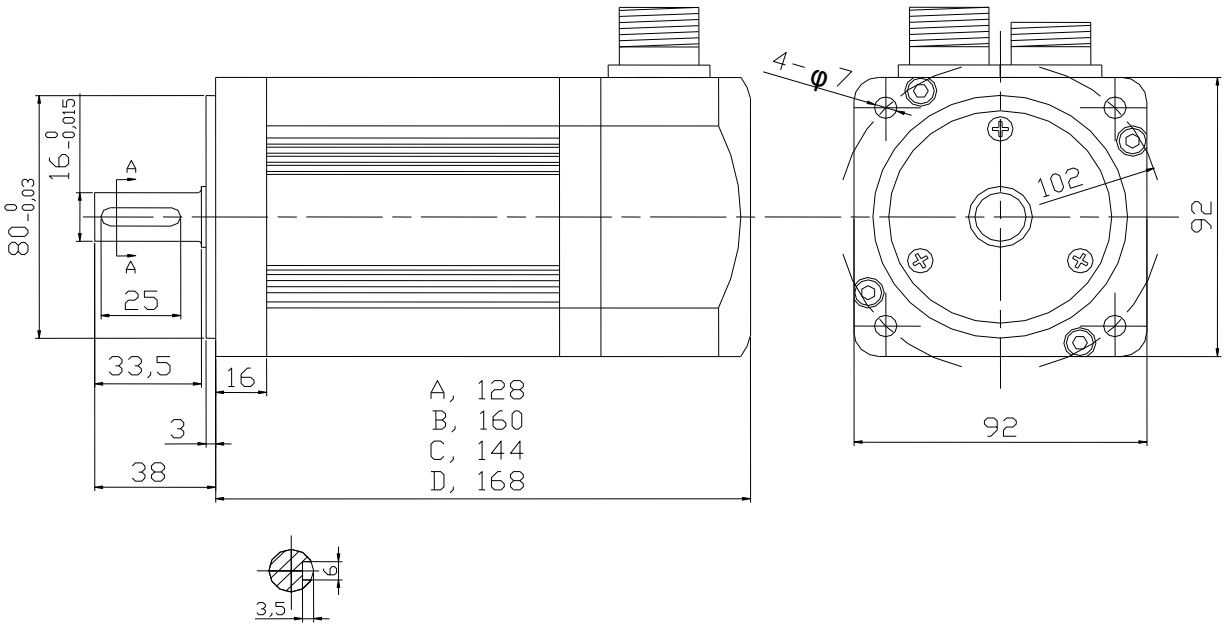
Dimensions of 60 Series motor



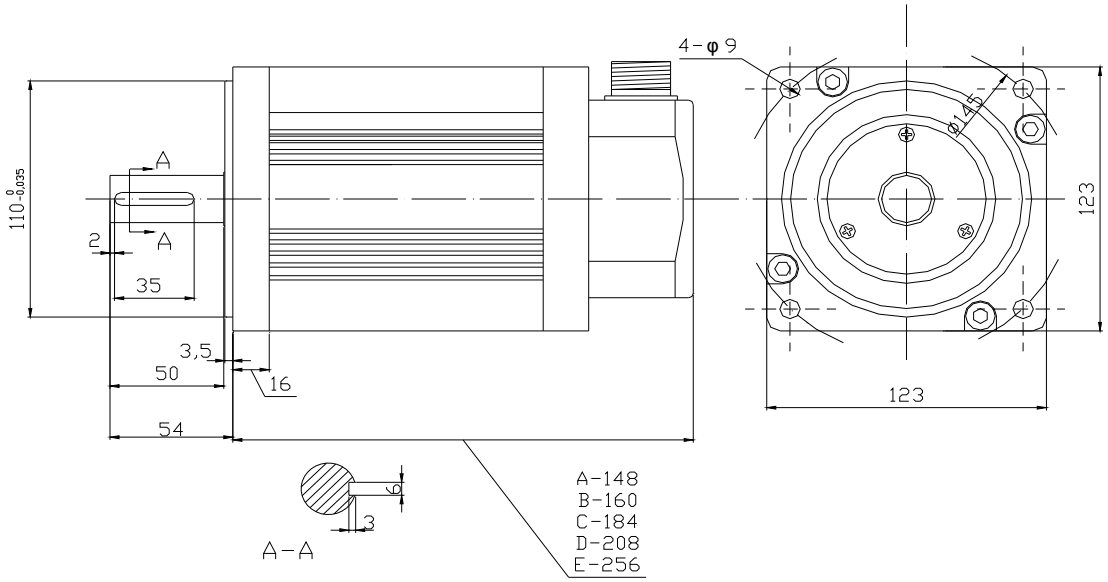
Dimensions of 80 Series motor



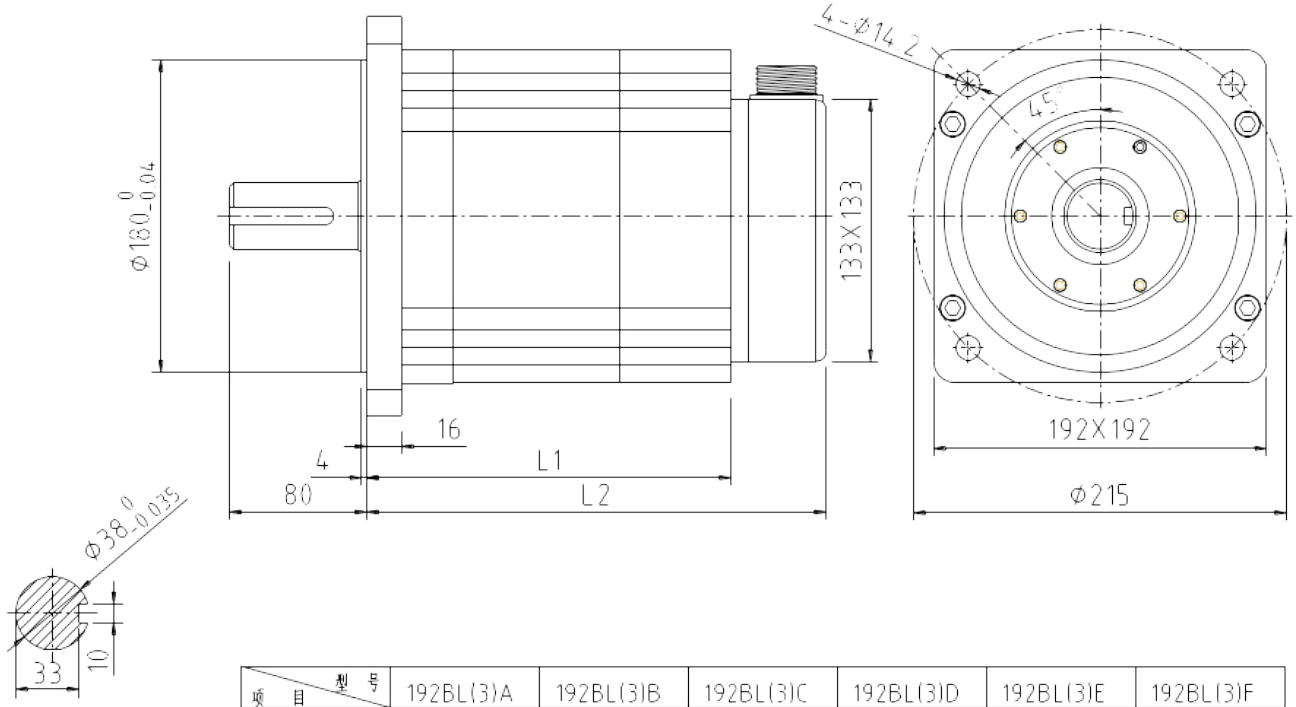
Dimensions of 92 Series motor



Dimensions of 123 Series motor

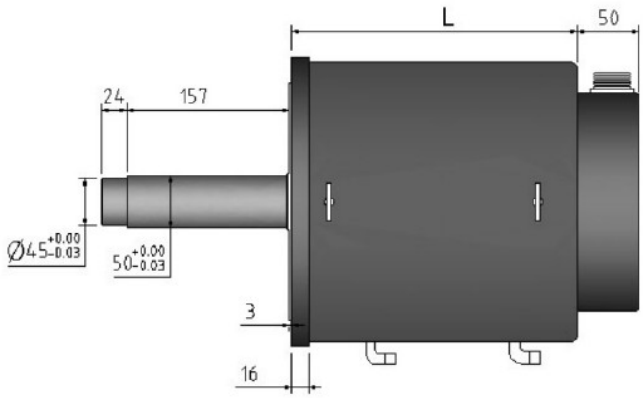


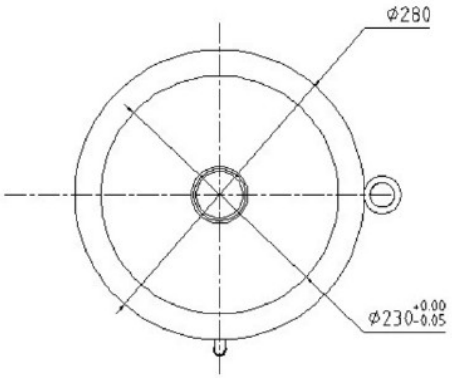
Dimensions of 192 Series motor



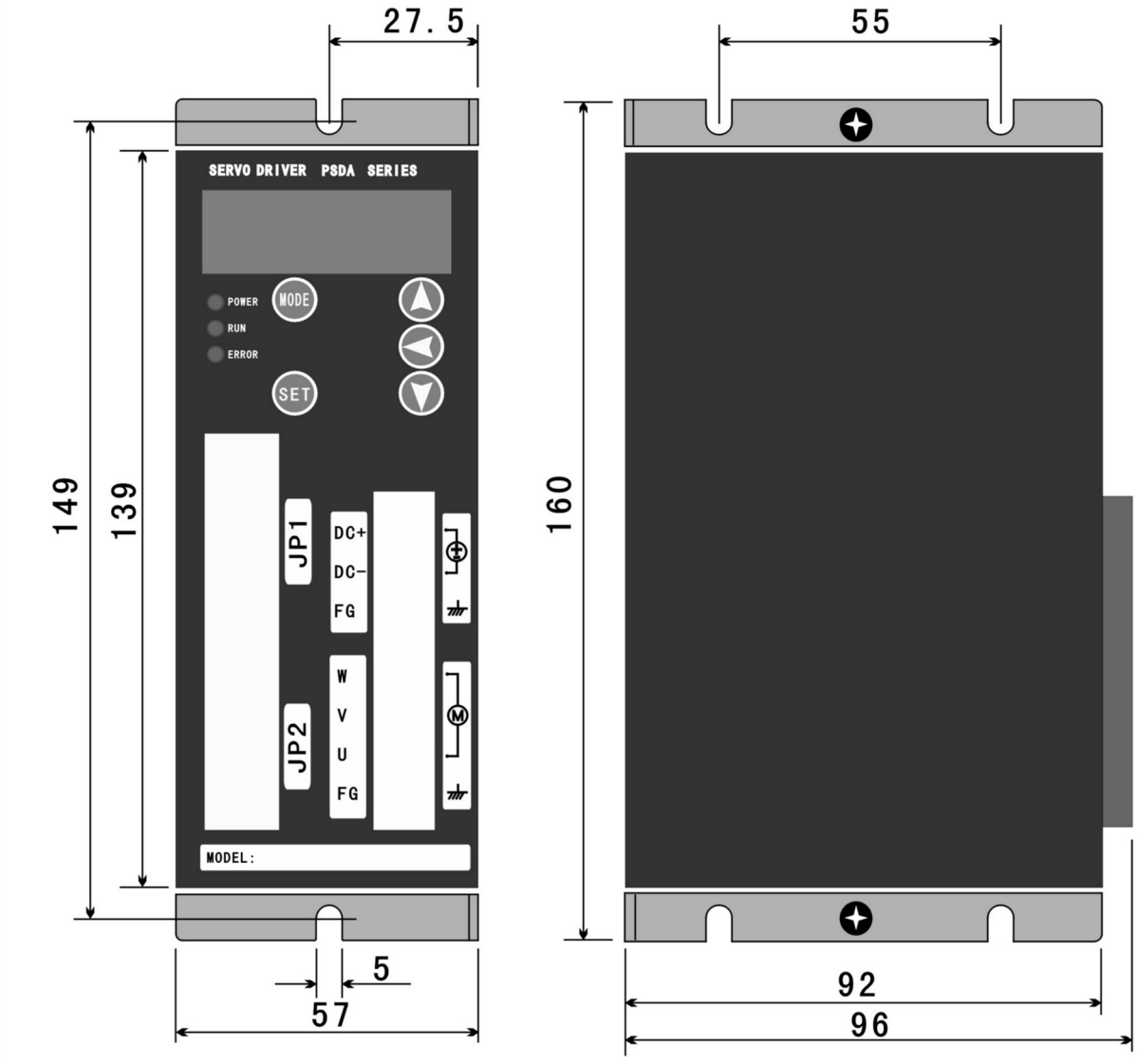
型号 / 项目	192BL(3)A	192BL(3)B	192BL(3)C	192BL(3)D	192BL(3)E	192BL(3)F
L1(mm)	152	178	204	230	256	295
L2(mm)	207	233	259	285	311	350

Dimensions of 192 Series motor





L	A	B	C	D
	198	268	376	466



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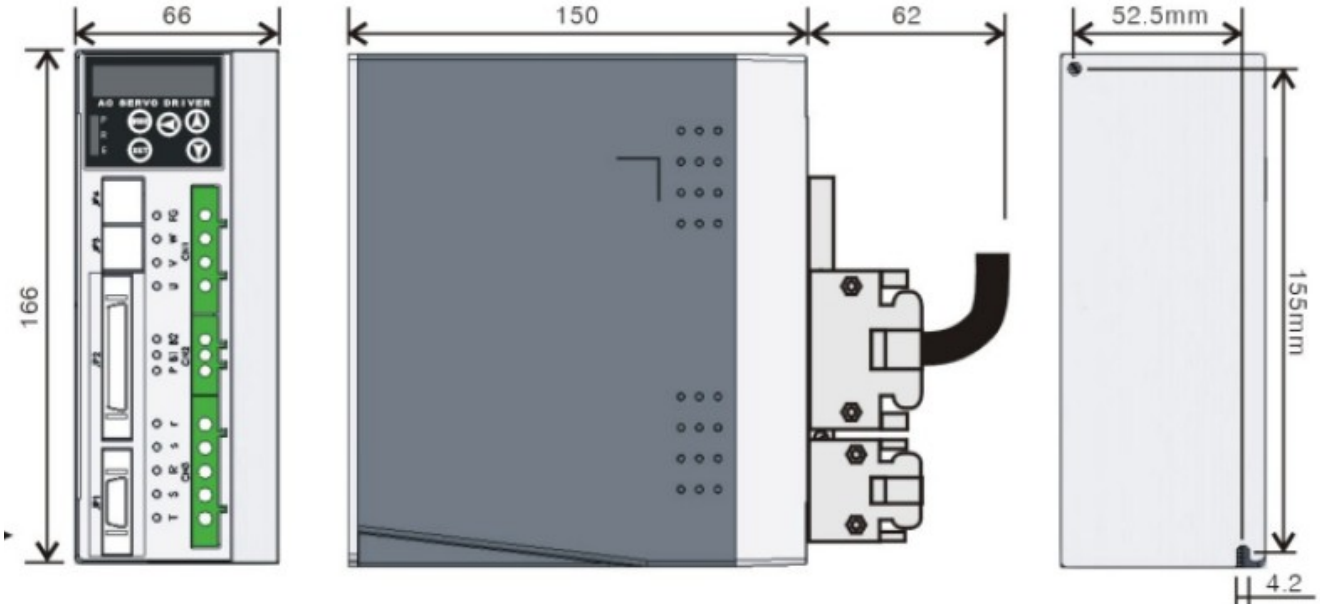

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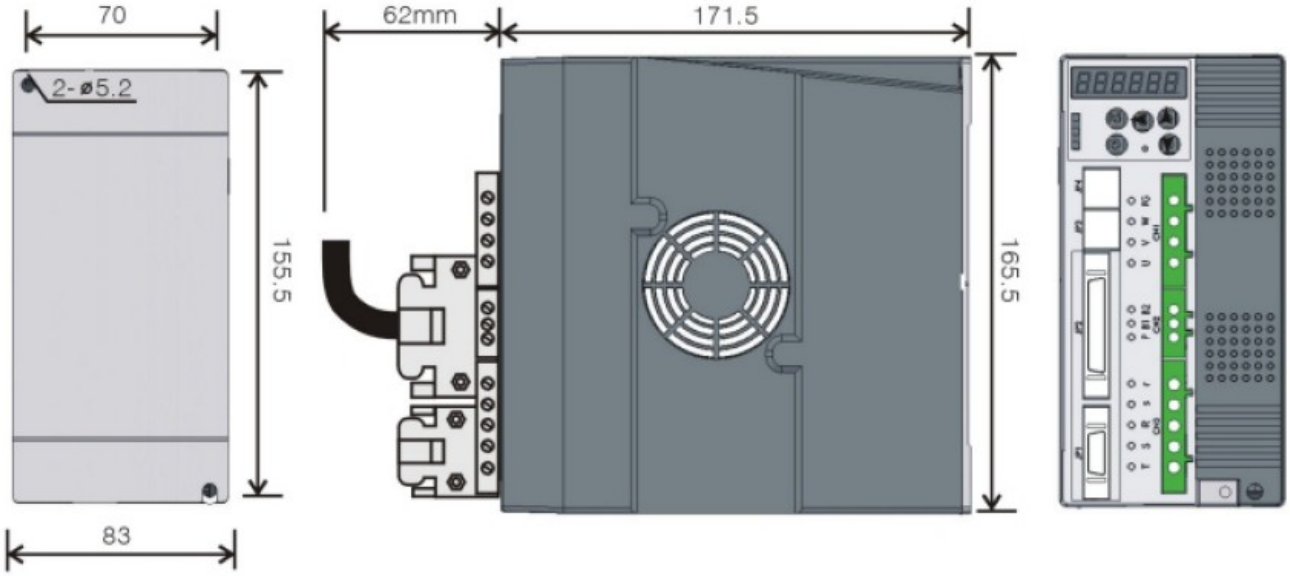
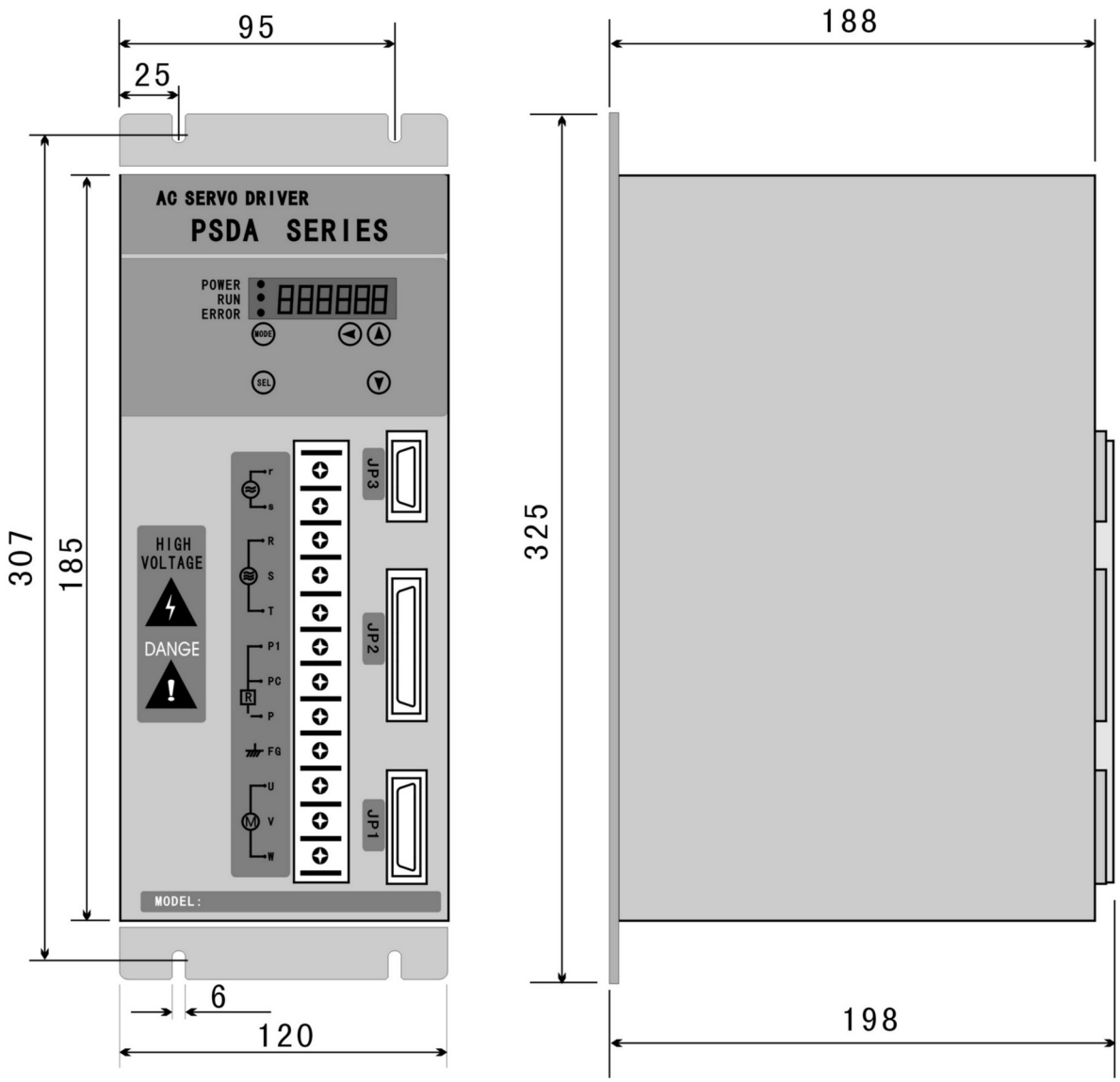


Dimensions of PSDA0833A6~



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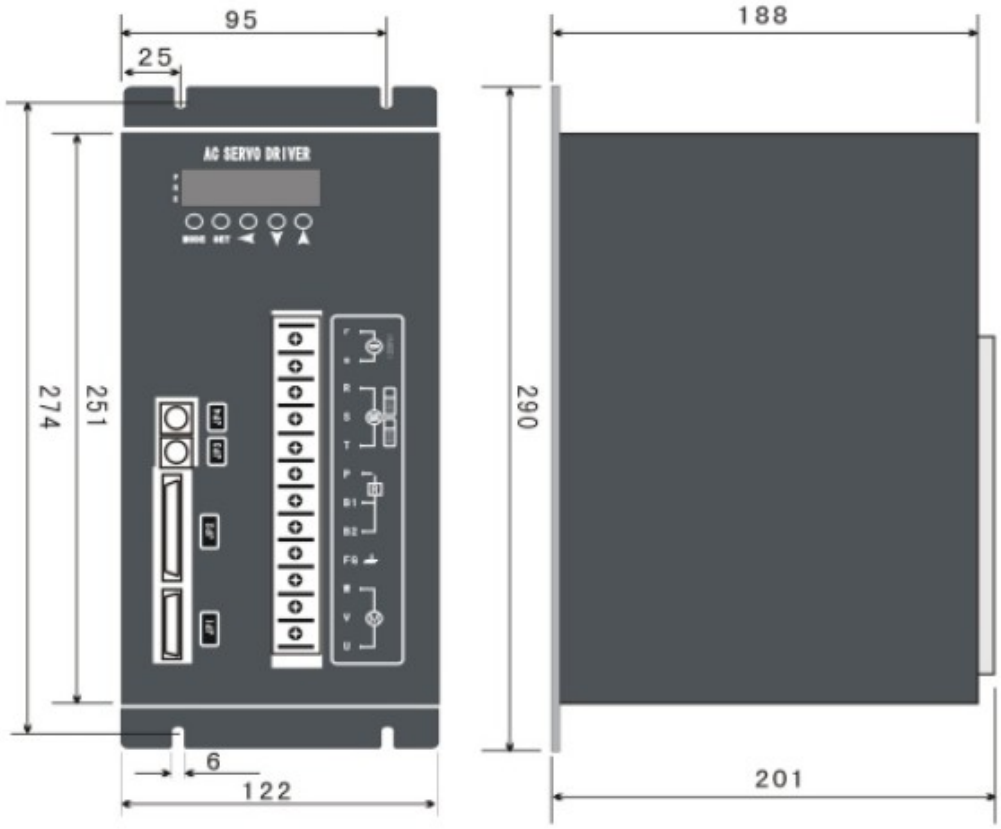

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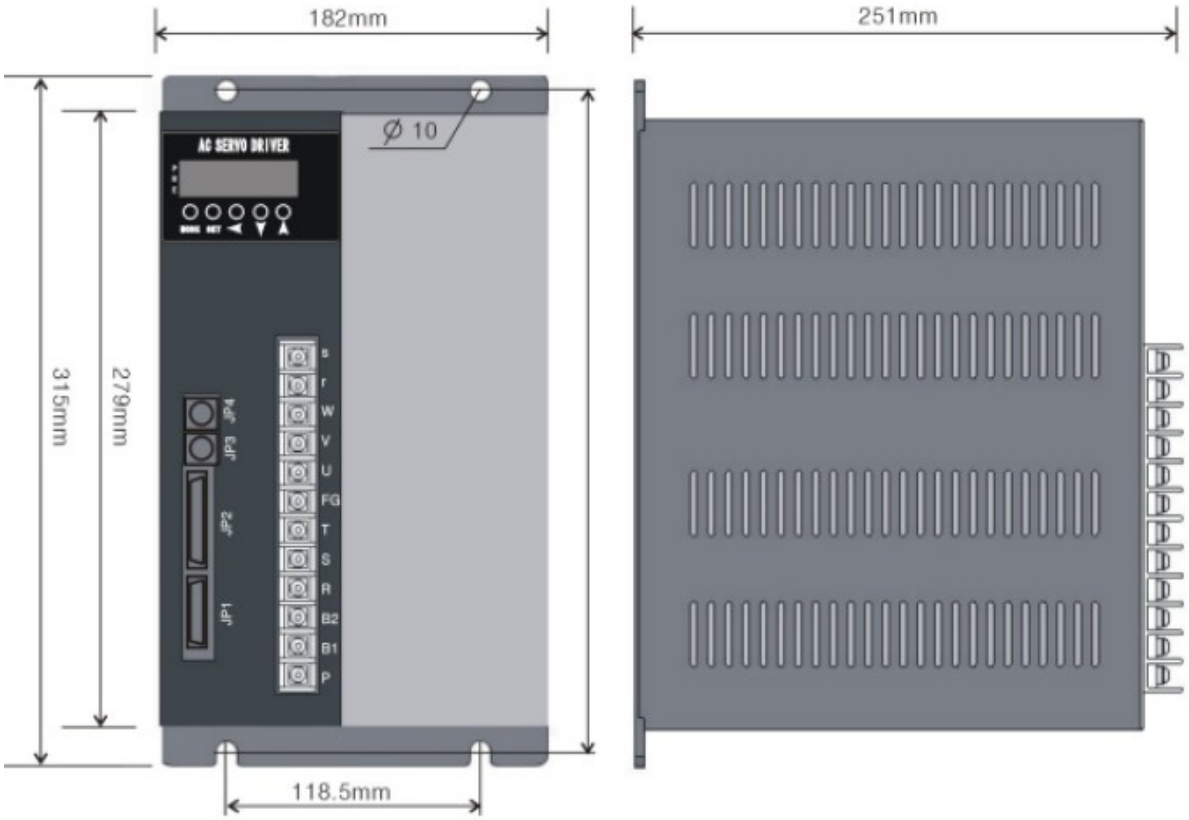

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